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The Shop Teachers' Professional Magazine

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MAY, 1951

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

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This Month's Cover

The cover picture for this month's issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION was submitted by Stanley O. Opsahl, instructor of photography at the Milwaukee Vocational and Adult Schools, Milwaukee, Wis.

The picture shows a machine-shop student working at an industrial-size machine in the school's machine shop.

★ ★ ★ ★

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Articles Indexed. — The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

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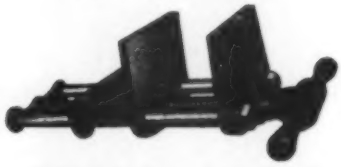

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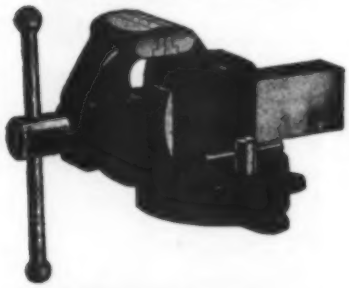

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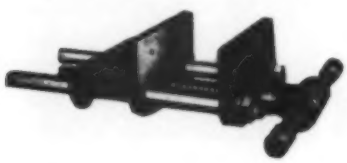

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ASSOCIATION NEWS

COMING CONVENTIONS

Apr. 19–21. Michigan Industrial Education Association, at Civic Auditorium, Grand Rapids, Mich. Secretary: Maurice C. Overholt, 316 S. Fifth St., Grand Haven, Mich.

Apr. 20–21. Missouri Industrial Education Association, at the University of Missouri, Columbia, Mo., in charge of Geo. Kohrman, state department of education, Jefferson City, Mo. Secretary: M. Stewart, State Department of Education, Jefferson City, Mo.

Apr. 27. Michigan Vocational Association, at Union Memorial, University of Michigan, Ann Arbor, Mich. Secretary: F. Donald Manz, 419 N. Capitol Ave., Lansing, Mich.

Apr. 27. Delaware Vocational Association, at Hob Tea Room, Wilmington, Del. Secretary: John Charlton, State Department, Dover, Del.

May 2–5. American Industrial Arts Association, at Hotel New Yorker, New York City. Secretary: D. A. Bricker, 216 E. 9th St., Cincinnati 2, Ohio.

May 3–5. Wisconsin Association for Vocational and Adult Education, at Hotel Schroeder, Milwaukee, Wis. Secretary: C. D. Rejahl, Commercial State Bank Bldg., Room 311, Madison, Wis.

May 12. Massachusetts Vocational Association, at Copley Plaza Hotel, Boston, Mass. Secretary: Kathleen G. Delaney, Girls' Vocational School, Lovell, Mass.

May 13–15. Minnesota Future Farmers of America, at University Farm, University of Minnesota, St. Paul, Minn. Secretary: Duane Steele, Cowger, Minn.

May 31–June 1 and 2. Nebraska Vocational Agriculture Association, at Scottsbluff, Neb. Secretary: R. O. Ginger.

AIAA CONVENTION

The American Industrial Arts Association will hold its annual convention at the Hotel New Yorker, New York City, on May 2, 3, 4, 5, 1951. Preconvention registration of guests and commercial exhibitors auger well for a successful convention.

Planning committee meetings have been held in New York City, New Jersey, and Florida.

Dr. DeWitt Hunt, A. and M. College, Stillwater, Oklahoma, is president of the Association. J. Lyman Goldsmith, Los Angeles Public Schools, California, is chairman of the Program Committee.

Topics on the agenda are: American Council on Industrial Arts Teacher Education; American Council on Industrial Arts Supervision; Industrialism and Industrial Arts; Industrial Arts and the Point Four Program; In-Service Training of Industrial Arts Teachers; Civil Defense and Shop Safety; Industrial Arts and Community Relations; The Industrial Arts Awards Program; Industrial Arts in Radio and Television; Post High School Industrial Arts Program; Teaching Techniques; Research and Experimental Programs; College Student Industrial Arts Organizations; Industrial Arts for All American Youth.

The annual dinner of the American Industrial Arts Association on Friday, evening, May 4, is sponsored by the Associated Guilds of Teachers of Industrial Arts of the City of New York. Dr. Edgar Fuller, executive secretary, Association of Chief State Officers, Washington, D. C., will speak on the topic "Some Crises in Education Today."

A Ship's Party will be held after the dinner.

The "Hospitality to Wives Committee" under the chairmanship of Mrs. John M. Hurley, New York City, has planned an interesting program for the wives of the conventionites.

(Continued on page 6A)

New York skyline from Governors Island
— New York Convention and Visitors Bureau, New York City

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ASSOCIATION NEWS

(Continued from page 4A)

The local arrangements committee is: John R. Ludington, Washington; James J. Hammond, Massachusetts; Robert Campbell, New Jersey; G. Wesley Ketcham, Connecticut; Kenneth W. Brown, Pennsylvania; Burl N. Osburn, Pennsylvania; E. Burnham Dunton, New Jersey; Carl E. Frankson, New Jersey; George Fern, New York; John M. Hurley, New York, chairman.

THE OHIO INDUSTRIAL ARTS ASSOCIATION

"Education Through the Hands for National Defense" was the theme of the annual convention of the Ohio Industrial Arts Association held at the Deshler-Wallick Hotel, Columbus, Ohio, March 15, 16, and 17.

More than 500 registered members attended.

Prominent speakers at the convention included Dr. Ralph C. Wenrich, professor of vocational education at the University of Michigan; Dr. Claude V. Courter, superintendent of Cincinnati schools; and Frank C. Moore, director of industrial arts for Cleveland schools, and past-president of the American Vocational Association.

At the convention dinner Friday night, Dr. Alfred P. Haake, Mayor of Park Ridge, Ill., economist, writer, and consultant to General Motors, was the chief speaker.

A panel discussed ways of improving industrial-arts education in Ohio to meet defense and mobilization needs, and a "Craftsmen's Fair," featuring demonstrations by "master teachers" in ceramics, electricity, plastics, graphic arts, photography, and electronics, was held on Friday and Saturday.

An outstanding feature of each annual convention is a display of industrial-arts projects made by students in Ohio schools. Prizes will be awarded in six classes — general woodworking, general metal work, electrical, graphic arts, plastics, and crafts.

At the annual election H. F. Edgar, Wauseon, Ohio, high school industrial-arts teacher, was elected to fill the unexpired term of Secretary A. Dwight Spayth, who has been recalled to active duty in the U. S. Navy. E. J. Robinson, director of industrial arts, Dayton, Ohio, was elected to a four-year term to the executive committee, representing the city schools. He succeeds Richard O. Knight, director of industrial arts, Columbus, Ohio, who has been an officer in the association for many years and has so ably handled the local arrangements for our conventions. — *Dean Kittle, professor of industrial arts, Ohio Northern University, Ada, Ohio.*

MIDWESTERN OHIO INDUSTRIAL ARTS ASSOCIATION

The Midwestern Ohio Industrial Arts Association had an exhibition meeting at Bowling Green State University, Bowling Green, Ohio, on Wednesday, April 11, 1951.

The association covers 22 counties in the Northwestern part of Ohio with approximately 250 instructors in its area.

An interesting program was presented for the craftsmen, superintendents, school board members, and industrial-arts teachers who attended. Demonstrations and open house were staged at the University shops in the afternoon.

(Continued on page 37A)

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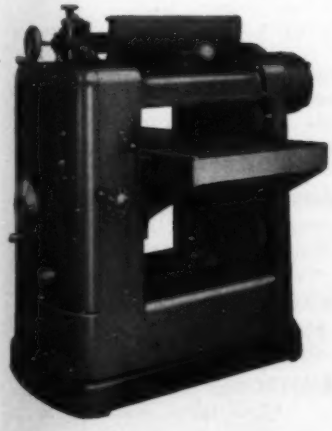

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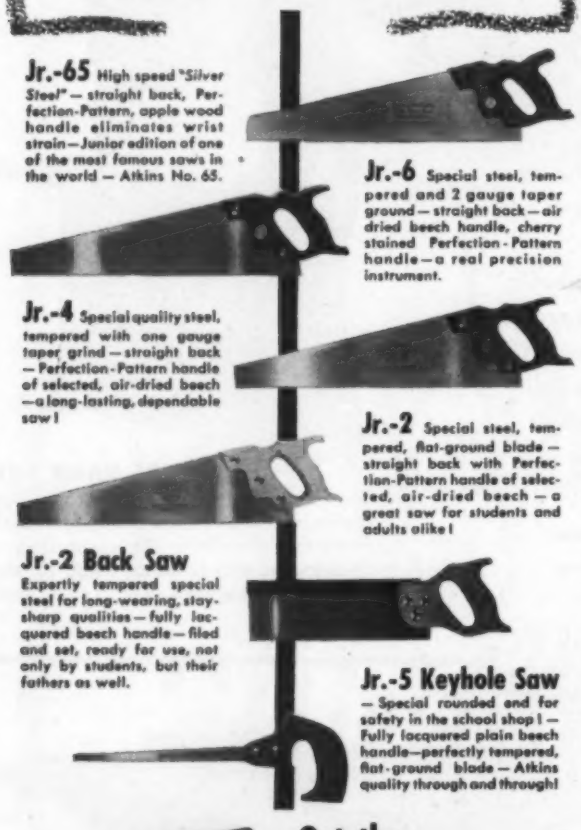

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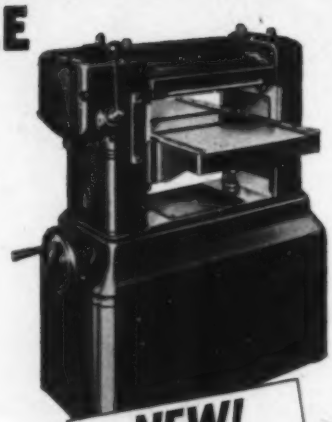
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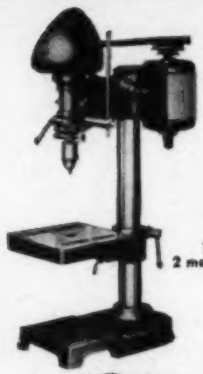
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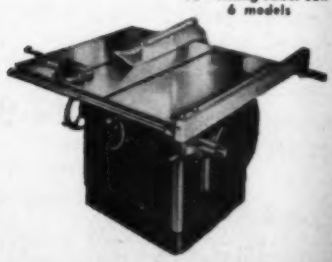
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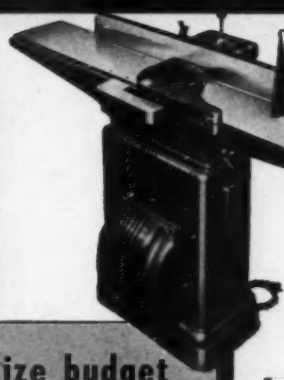

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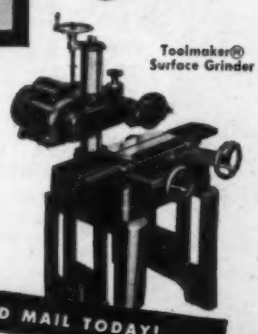

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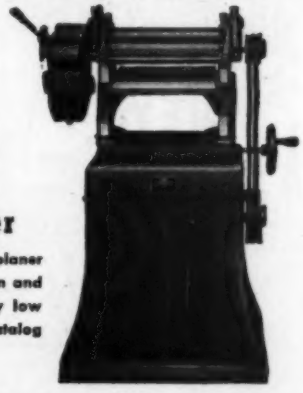

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They're true professional tools—accurate, finely finished, rugged. They feel right. They give your students respect for the tools entrusted to them. They speed training . . . build confidence and competence. Every dollar of your tool budget invested in Snap-on Tools pays off—in years of faithful service and in better teaching results with each year's classes. FREE to school shop officials or instructors: (1) Illustrated 104-Page Catalog; (2) Socket Wrench Educational Chart; (3) Boxocket Educational Chart. Write to Snap-on Tools Corporation, 8074-E 28th Ave., Kenosha, Wis.
Snap-on Tools
THE CHOICE OF BETTER MECHANICS

You Can Give Your Students Better, More Complete Instruction with 40TH YEAR Atlas Tools

10" SAWS

The ultimate in fine saw construction at low cost. Cuts 3¼" deep. 35" x 27½" precision-ground table. 19½" right of blade, 13" ahead of blade, quick-positioning fence, vernier control.

HERE'S WHY 1. Each Atlas tool has exclusive operating or design features that help you broaden the scope of instruction, improve accuracy, and save time on projects so that more can be completed each term. 2. All Atlas controls are easy and smooth to operate. Add the Atlas features of rugged, precision construction, ball bearings, and low cost — and see why more and more industrial educators are standardizing on Atlas tools for all new equipment installations. Send the coupon below for free wall charts and latest catalog.

SPINDLE SHAPERS

15" x 21" precision-ground table. Table adjusts vertically, stationary spindle for smoother cutting.

10" and 8" SAWS

Handle most school sawing needs at lower cost. 8" saw (shown) cuts 2⅛" deep; precision-ground table 35½" x 22" with 2 extensions, 10¾" ahead of blade.

12" BAND SAWS

The ideal size for school shops. 14" x 14" precision-ground table tilts 45°. Cuts stock to 6¼" thick. Ball bearing equipped.

12" WOOD LATHES

36" between centers. Ball bearings at *both* ends of spindle for smoother running and longer wear. Lever locks on tailstock and tool support base — no wrenches to lose.

24" JIG SAWS

The finest on the market. 14" x 14" precision-ground table tilts right and left, swivels 90°. Four speeds for wood, metal, plastic, composition. Cuts 2¼" thick. Chucks index 90°.

6" JOINTERS

The last word in jointer design. 42" long precision-ground table. 32" x 4½" fence supported close to cutter head. Stationary rear table for lasting accuracy.

15" DRILL PRESS

Finest made for school shops. Bench and floor models. 4 ball-bearing spindles, steel to steel drive, wider head support bearings, new depth control stop, smoother operation.

BELT & DISC SANDERS

Sands any width boards, angles, curves, metals, plastics for complete sanding instruction. 10" disc, 4" belt, table tilts 45°.

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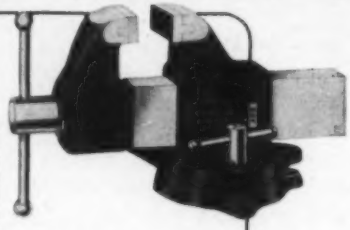
DEPENDABLE QUALITY TOOLS

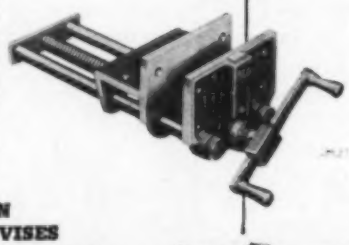
COLUMBIAN VISES

for many varied uses

COLUMBIAN MACHINISTS' VISES

Columbian Malleable Iron MACHINISTS' VISES are guaranteed unbreakable! In addition to their exceptional strength, Columbian engineering has built into these vises the finest mechanical perfection and special features appreciated by users. Made in all standard sizes—3" to 8" jaw widths equipped with replaceable tool steel jaw faces. Available also in adjustable jaw and combination pipe vise types.





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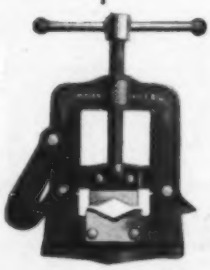
Continuous Screw & Rapid Acting Columbian Woodworkers' Vises are finding increased uses in many plants particularly for the more ordinary types of pattern work. These durable low cost vises are sturdily built with jaw openings up to 12 inches.

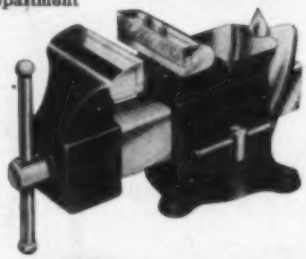


COLUMBIAN HINGED PIPE VISES

Columbian Malleable Iron HINGED PIPE Vises have self locking unbreakable hooks, tool steel pipe jaws, cold rolled steel screws and handles. Sizes for holding pipe from ⅛" up to 12". Every department should have one.

COLUMBIAN WORKSHOP VISES

Sturdily designed with covered screw, heat-treated jaw faces, "Tri-Grip" permanent pipe jaws, swivel base 2 sizes 3½" and 4" jaw widths and 4" and 5" jaw openings. For home workshop, garages and general use.



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Simple, two pedal foot control leaves both hands free. 3½" jaw widths and 6" jaw openings. Precision manufacturing and tested quality guarantee positive operation and dependable power. Saves time — speeds production — accurate work position.

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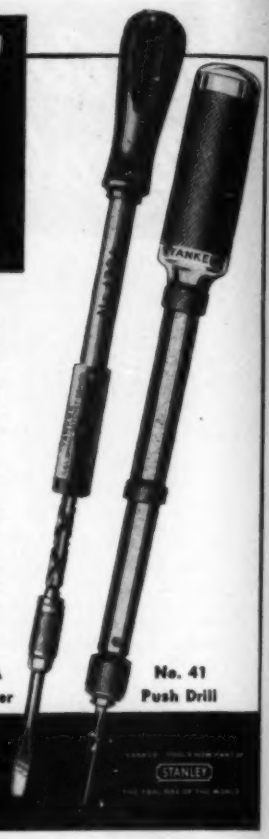
TEACH MOTION-SAVING

Help students do better work with fewer motions. Just a simple push with a "Yankee" Spiral Screw Driver spins the blade and drives the screw. No heavy wrist work! A flick of the shifter gives driving or drawing action, or sets spiral rigid. Pilot holes made easily with a "Yankee" Automatic Push Drill. Spring brings back handle after every push; reverse-spins drill point to clear out chips. Magazine handle holds 8 points, 1/16" to 11/64". Write for free "Yankee" Tool Book.



No. 130A Spiral Driver

No. 41 Push Drill

NORTH BROS. MFG. CO.

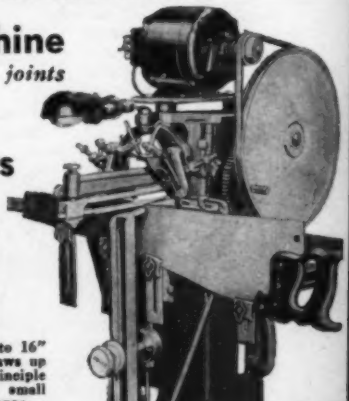
Philadelphia 33, Pa.

SAW FILING

This ONE Machine

automatically files and joints

HAND, BAND, CIRCULAR Saws



The Foley Saw Filer is ideal for sharpening saws used by students in school shops. It keeps them in tip-top shape, faster and better than by hand filing. Used by Army, Navy, hundreds of manual training departments and industrial plants. The Foley is the only machine that files and joints all hand, back and mitre box saws from 3 to 16 points per inch, crosscut circular saws up to 16" diameter (24" optional), and band saws up to 24' long. Patented jointing principle automatically evens up large and small teeth, so saws cut faster, truer, cleaner — stay sharp longer. Foley filed saws have less breakage and last longer.

30-DAY TRIAL OFFER

You may have the privilege of using the Foley Saw Filer in your own shop for 30 days. Write or send coupon for details and list of school users.

TYPICAL SCHOOL USERS

Berea College, Berea, Ky.; Board of Education, Cleveland, Ohio; Boys Technical H. S., Milwaukee, Wis.; Charleroi School District, Charleroi, Pa.; Redlands Public Schools, Redlands, Calif.; Stout Institute, Menomonie, Wis.

FOLEY Automatic SAW FILER

FOLEY MFG. CO., 3318 N.E. 5th St., Minneapolis 18, Minn. Please send full information on 30-Day Trial Offer and list of school users of Foley Saw Filers.

Name.....

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No. 1 on your requisition!

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HARGRAVE TESTED TOOLS

Top-flight industrial arts and vocational schools start their students on Hargrave INDIVIDUALLY POWER-TESTED Tools . . . the hand tools used and approved by industry everywhere. The tough, flaw-free construction of Hargrave Tools is guaranteed by exacting production tests. They withstand rough handling and continuous shop use by trainees.

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Openings: 1, 1½, 2 and 2½ feet

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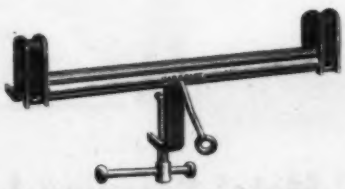
Openings: 2, 2½, 3, 4, 5, 6 and 7 feet

QUICK CLAMPS
Openings: 4 in. to 60 in.
Depths: 2 in. to 9 in.

NO. 600 CLAMP FIXTURES
For ¾ inch pipe
Clamp Fixtures for ½" pipe, and also wood bars are available.



IMPROVED FOLDING STEEL SAW VISE, NO. 22
For use with any standard saw set.
Filing space 10½" long

SUPER-JUNIOR CLAMPS
Openings: 1, 1¼, 1½, 2, 2½ and 3 inches

NO. 44 FORGED STEEL SUPERCLAMP
Openings: 2, 3, 4, 6, 8, 10 and 12 inches

STEEL SPINDLE HAND SCREWS
Openings: 2, 3, 4½, 6, 8½, 10, 12 and 14 inches

NO. 43 WELDERS' CLAMP
Patented, solid alloy anti-spatter screws. Also light and deep reach welders' clamps. Openings: 4, 6, 8, 10 and 12 inches.

NO. 540 CARRIAGE CLAMPS
Openings: 2½, 3, 4, 5, 6, 8, 10, 12 and 14 inches

FOR TEACHING
Standard Planing Practice
HERE IS, by long odds, your Best Bet!

BUSS NO. 208 WOOD PLANER

CAPACITY 20" x 8"

It is the only planer in the low-cost field that is adjusted and operated similarly to the large standard machines used in industry . . . the only planer in this class that is equipped with a sectional infeed roll, sectional Chipbreaker, four driven rolls, in-built knife grinder and other big planer features. The grinder permits the instructor to grind the knives in just a few minutes. It saves a great deal of his time and tends to eliminate the dull knife condition which so frequently prevents the student from doing good work. Engineered for maximum protection, the No. 208, judged from any angle, is the best possible selection for teaching standard wood planing practice in the school shop. And the price is well within the means of the average school budget. Write for the complete facts.

BUSS
MACHINE WORKS
246 Eighth St., HOLLAND, MICHIGAN

IDEAL METAL CUTTING SAW FOR YOUR SHOP!

***Kalamazoo* BAND SAW**

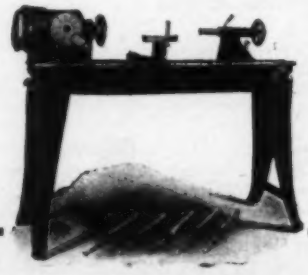
A veritable workhorse in any school shop! Prepares bars, angles, tubes, pipe, and rounds for work on other machines with no burr, minimum kerf. Works fast, smooth, and accurately. Familiarizes students with industrial metal cutting techniques. Uses standard ⅓ HP 110/60/1 motor. Completely portable. Write for details.

Model 610-S. Capacity 6" round, 6" x 10" flat. Coolant equipment available.

MACHINE TOOL DIV. *Kalamazoo* TANK and SILO CO.
547 HARRISON ST. KALAMAZOO, MICH.

An "Oliver" Metal Spinning Lathe can be the most helpful machine in your shop

You can teach students rapidly to spin practical articles of surprising beauty from pewter, copper, bronze, etc. The smooth flow of power from this "Oliver" spins 20-gauge steel with ease. Has heavy bed, extra large bearings. Motor-driven ball bearing headstock adjustable from 800 to 2750 r.p.m. For wood turning, this Lathe is unmatched.



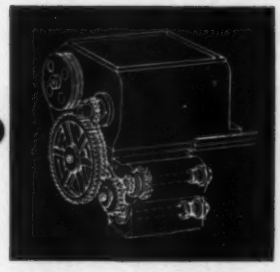
Write for Bulletin No. 159-M

"Oliver" Metal Spinning Lathes
OLIVER MACHINERY COMPANY, GRAND RAPIDS 2, MICH.

quick change artist

Reposition just 3 parts

Set up only two additional gears



from English to metric thread-chasing in about ten minutes*

Your students can learn to cut metric threads without old fashioned pick-off gears when you provide them with Cincinnati Tray-Top light duty engine lathes. Just three straightforward steps change Tray-Tops from English to metric thread chasing over the full range of 48 threads and feeds through the standard quick-change gear box — in a matter of minutes. The all geared head provides 12 spindle speeds — quickly selected by an exclusive 3-lever color-match dial control, gives students a wider range of problems they'll face in actual shop work. "Tray-Top" parking spaces above headstock and tailstock encourage good housekeeping.

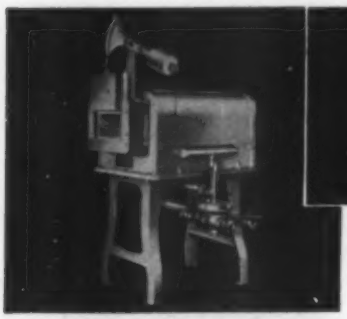
For versatility, convenience, low maintenance and economy, make your next light duty lathe a Cincinnati Tray-Top. Swing sizes 10", 12½", 15" and 18".

***of growing importance in defense production.**

CINTILATHE

OF OUTSTANDING VALUE

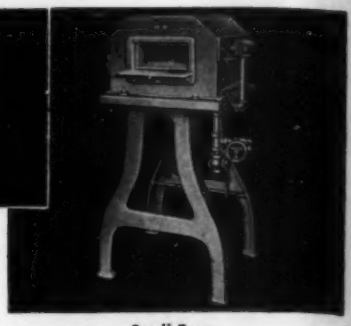
CINCINNATI 9, OHIO, U.S.A. **cincinnati lathe & tool co.**



Small Semi-Muffle Oven

Sunbeam STEWART

THE BEST INDUSTRIAL FURNACES MADE



Small Forge

HUNDREDS OF THESE SUNBEAM STEWART FURNACES ARE IN THE VOCATIONAL DEPARTMENTS OF TECHNICAL SCHOOLS

Round Pot Furnace

Because Sunbeam Stewart units have been designed for efficient production heat treating in small shops and tool rooms, they are widely recognized as standard equipment for all types of industrial heat treating and vocational training work. For student instruction and reference, write for our free "Guide to Furnace Selection." Aids in determining the type of furnace best suited for any work. Also ask for the new Data File on school units.

SUNBEAM STEWART INDUSTRIAL FURNACE DIVISION OF SUNBEAM CORPORATION (Formerly CHICAGO FLEXIBLE SHAFT CO.)

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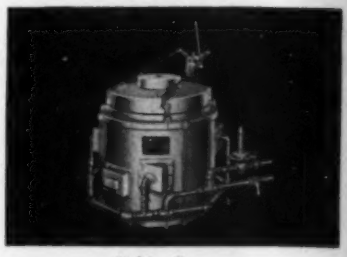
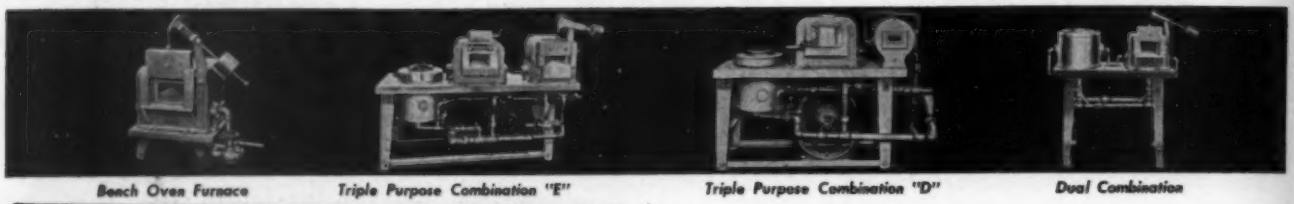


Melting Furnace



Bench Oven Furnace — Triple Purpose Combination "E" — Triple Purpose Combination "D" — Dual Combination

Where "SMALL WORK" GRINDING JOBS are concerned —

INDUSTRY DEPENDS ON Foredom FLEXIBLE SHAFT MACHINES

for TOP PERFORMANCE VERSATILITY and SPEED!

Model 9050
ONLY $29.60
COMPLETE with 6-STEP FOOT RHEOSTAT and PENCIL-SIZE HANDPIECE

Bench and Hang-Up Models, also models like Model 9050 (illustrated) which can be hung up, set on bench or mounted under bench. 5 Handpiece types, pencil-size or larger, all with quick detachable feature. Extra good flexing qualities provide utmost freedom of movement in handpiece.

QUALITY TESTED SINCE 1922

Use Foredoms to GRIND, POLISH, DRILL, ROUT, MILL, SAW, SLOT, CLEAN, SAND, ETCH, ENGRAVE, CARVE, etc., etc. In industry, they are profitably used in ALL THREE DEPARTMENTS — production, tooling, and maintenance. Ideal for the astounding new craft, internal carving of plastics.

Send for Catalog 6905. It will give you valuable information on the many uses for Foredom Machines.

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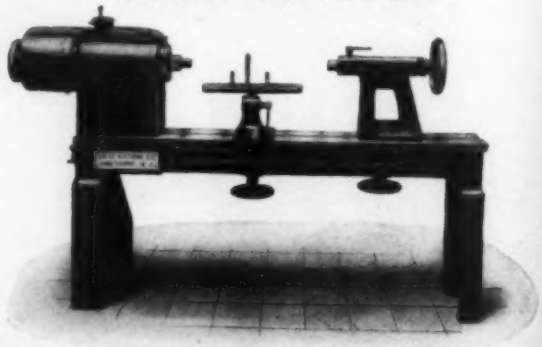
HAAG METAL SPINNING LATHES

Excell in Simplicity and Ease of Operation.

- Our "SPIN MASTER" lathes are preferred by industry because they are rugged, precise and simple. No complicated speed changes to get out of order.
- For teaching and for industry you cannot go wrong with a

"SPIN MASTER"



"V 50" The "SPIN MASTER" with over 1000 speeds.

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Metal Spinning Accessories and Equipment.

WRITE FOR DETAILS.

New!

Self-centering chuck on the Stanley No. 923 Bit Brace

With a NEW *self-centering* chuck, the Stanley No. 923 Bit Brace is ideally suited for use in school shops. Just drop the bit into the square socket, tighten the chuck and the bit automatically centers itself. Securely seated in a square steel socket it's ready for any boring job. Carefully designed, simply constructed, the NEW chuck on the No. 923 Bit Brace makes centering the bit easy and positive for your students. Makes your teaching easier, too.

Train students with Stanley. Be sure to include the No. 923 Bit Brace with the *self-centering* chuck and other Stanley Tools on your Tool requisition. Stanley Tools, Educational Dept., 104 Elm Street, New Britain, Connecticut.

OTHER FEATURES INCLUDE: Steel clad, ball bearing head with bronze bushings. Cocobolo handle and head. Strong, sturdy, all steel box ratchet. Universal jaws. Takes all square taper shank bits and round shanks from ⅛" to ½". 5 sizes—6" to 14" sweep.

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Reg. U.S. Pat. Off.

HARDWARE • TOOLS • ELECTRIC TOOLS • STEEL STRAPPING • STEEL

Sand with, against and across the grain!

New PORTER-CABLE Guild Orbital SANDER Model 105

Only $59.50

Featuring ORBITAL MOTION — all abrasive grits moving in a tiny circular path at high speed, regardless of direction sander is guided.

Now in a quality tool at a price that's right—*orbital motion* sanding that gives woodworking projects a flawless finish—*with, against* or *across* the grain! Not a vibrator sander, but a motor-driven production tool.

Designed for convenient one-hand operation, the Guild is vibrationless . . . lightweight (only 5 lbs.) . . . handles as easily as a sanding block. It cannot gouge or mar—will not scratch. Even a beginner can sand velvet-smooth, uniform surfaces. And the Guild 105 is as flexible as the wrist that guides it—sands right up to trim or moulding . . . into corners . . . on curved surfaces. Abrasives are easily changed for coarse and finish sanding, rubbing or polishing on wood metal, composition, plastic. Uses one-third of standard sandpaper sheet. Sponge rubber pads for concave and convex surfaces also available.

● Many of your present students may one day earn their living with this sander. You owe it to them—now—to teach Guild *orbital-motion* sanding. The price makes it a buy for school shop and maintenance work. Your Guild Dealer is ready to demonstrate. Or send coupon for detailed description and specifications.

PORTER-CABLE MACHINE CO.
4025 N. Salina St., Syracuse 8, N.Y.

Please send me full information on the new Guild 105 *orbital-motion* Sander . . . also name and address of my nearest Guild Dealer.

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Address.....

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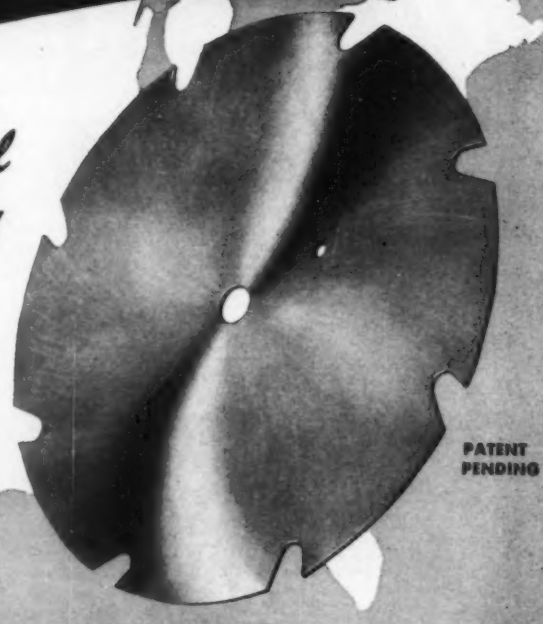
Manufacturers of SPEEDMATIC and GUILD Electric Tools
In Canada write Strongridge, Ltd. St Catharines, Ont.

The Most Amazing Saw Blade In America Today . . .

PTI *the original* **SAFETY SAW BLADE**



Eliminates Danger from Circular Sawing

Saves Power, Cuts Smoother, Lasts Longer

Here is the greatest improvement in circular sawing—since the invention of the circular saw. The sensational new PTI Cut Control Saw Blade that brings long-needed safety and remarkable new efficiency to this important tool! Now for the first time you can have a new circular saw safeguard in addition to the regular blade guards, splitters and anti-kickback holders—a safeguard that protects operators even if the conventional devices are inadvertently or carelessly removed.

Only PTI Safety Saw Blade offers all these Advantages

1. Complete safety from kick-backs; 2. Reduced possibility of direct injuries; 3. Cuts chips, not sawdust; 4. 30% to 40% power saving; 5. Longer life without sharpening; 6. Smooth cutting; 7. Quieter running; 8. Less danger of blade cracking; 9. Made of chrome Vanadium Steel; 10. Available with solid tooth or carbide tipped.

TESTED AND APPROVED

The PTI Cut Control Saw Blade is the first and original blade of this type. It was developed by one of the world's foremost saw manufacturers —and then thoroughly tested in the leading shops and laboratories of Europe and America for more than two years. It is the first saw blade of this kind tested by the Forest Products Laboratories, Madison, Wis., Timber Engineering Company, Washington, D.C., the University of Zurich, Switzerland, and other testing laboratories with favorable reports issued in every instance.

Actual letters from delighted users in America and Europe crowd our files.

See Your Dealer

See your nearest PTI dealer today . . . ask for a demonstration. Prices for special Vanadium Steel blades, combination rip and cross cut, are:

7" dia. blade	$4.95	12" dia. blade	$ 9.40
8" dia. blade	$5.90	14" dia. blade	$11.40
10" dia. blade	$7.50	16" dia. blade	$14.00

(Prices on carbide tipped blades on request.)

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Gentlemen: Please send me complete information on this amazing New Safety Circular Saw Blade.

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Canadian Distributors: The Preston Woodworking Machinery Co., Ltd., Preston, Ontario, Can.

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

MAY • • • • 1951

A Challenge to Vocational Education

ROBERT W. CYNAR
Hempstead, N. Y.

If an industrial concern was selling only 30 per cent of its products, one can readily realize that the manufacturer would not remain in business for long. This would indicate that there were serious problems in management, production, and sales, which would have to be overcome if any reasonable return on the investment could be expected. Nevertheless, our vocational schools are operating on this basis. True, we are dealing with a delicate piece of merchandise — the adolescent — and undoubtedly, many ramifications enter into the picture, which cannot be handled with the dogmatic technique of sales, production, and management. However, a parallel may be drawn in education and business. For instance, the management may be compared to the curriculum, production to the method of instruction, and sales may be thought of as placement of our product, the vocational high school graduate.

If education were as simple as production, where a cup is made for drinking and probably will never be used for anything else, the problem would be complex. But when we deal with intangibles, for an ever changing society, the obstacles become almost unsurmountable. When, after training a boy for three years to become a machinist, he suddenly decides that he does not want to be a machinist, but would rather be a painter, "like Dad," it is a tragedy, indeed. Such a mistake is a serious reflection on our vocational guidance program, and we are guilty of misdirecting and wasting three years of the youngster's life. Here is one challenge we cannot shake off with the cry of inadequate guidance. The number of guidance periods assigned to junior high school teachers are more than adequate. The problem lies in better guidance, and not more guidance.

There is little doubt that the philosophy of vocational education is sound, but there is a world of difference between reality and a well-phrased set of objectives. On one hand, we would like to assure the greatest degree of success for our enrollees. This would be assured to a great extent, if we could select our students, taking only average and above average students. On the other hand, we are more realistic than our academic brethren. We realize that we have an obligation to *all* our youth and not only to the selected few. Therefore, we take greater cognizance of Dr. Prosser's neglected 60 per cent. We must provide "the life adjustment they need and to which they are entitled as American citizens."[1]

The problems presented by the compulsory education laws are many and complex. But the bulk of these obstacles seem to be centered in the vocational schools. The motives which led to the passage of these laws are mixed. "Humanitarian interest in lengthening the period of development so as to give young people larger opportunities to prepare for adulthood, has undoubtedly been strong in the minds of some advocates of compulsory education laws. Equally strong, though perhaps less openly expressed, has been the desire to keep youth off the labor market."[2] Here is another example of a law that appears noble on paper, but in reality is difficult to administer, causes considerable confusion and does not achieve its original purpose. Young people who want to leave school as soon as possible, do not make good students. Whether they are average students who are compelled to leave school because of home conditions, or whether they are students who are only awaiting their sixteenth birthday, they eventually find their way to vocational schools, thereby increasing the percentage of dropouts unduly.

The problem as previously enumerated, deal with: (1) dropouts; (2) failure of students to find employment in their field of study; (3) compulsory education laws; (4) curriculum; (5) techniques of instruction; and (6) placement. The first three are external problems which require legislative action that must come from the state board of education. The remaining three are internal problems and must be handled in each school on an individual basis.

The External Problem

It is the contention of many, that vocational education should not be taught in grades 10, 11, and 12, as is the present practice, because of the following reasons:

1. Students are immature and cannot efficiently absorb this type of specialized instruction. This situation leads to many dropouts, poorly trained students, and consequently places vocational education in an unfavorable light. Personal research shows that vocational graduates are usually assigned as errand boys, and it is a considerable time before they can put

[1] *Vocational Education in the Years Ahead*, U. S. Office of Education, Vocational Division, Bulletin No. 234, 1945, pp. 325.

[2] *What the High Schools Ought to Teach*, American Council on Education, Washington, D. C., 1940, p. 7.

their training into practice. This is largely due to the fact that the students are comparatively young and the employer hesitates to entrust them to work on expensive machinery.

Those having experience on the Veterans and Reconversion Training Program draw this comparison: They believe the reason these men are doing a far superior job in absorbing trade training is because they are slightly older than full-time students: (*a*) they realize the seriousness of their training; (*b*) they know their future depends on their attentiveness; (*c*) and finally they feel a personal need for this instruction.

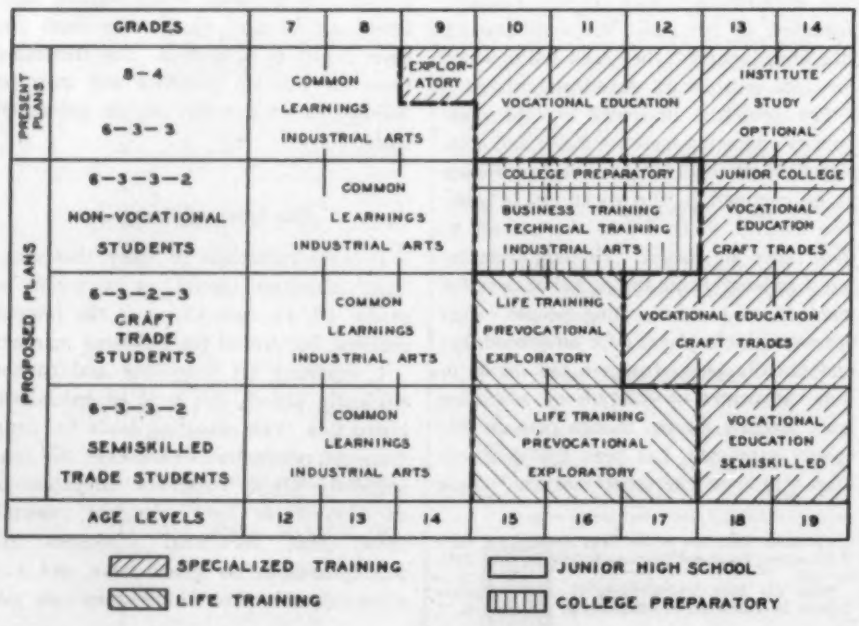
When questioned, regarding student progress, a number of instructors in the New York State Institutes of Arts and Sciences, volunteered this observation. "The students were most enthusiastic about the program and showed excellent progress." The reason for these answers are obvious. They are more mature students and have a personal need for this type of instruction.

2. The problem of students not working in the field for which they were trained is a moral one. To waste three years of a youngster's life is a crime against society, and no amount of vocational guidance can solve this serious offense. Vocational counselors agree that students choose their vocations and schools on the following basis: (*a*) their friend is attending the school; (*b*) it is near home; (*c*) they want to be like Dad, and (*d*) parents have predetermined what they want their children to be, regardless of any school counseling. Last year one guidance counselor sent a student with a lame arm to an electrical school, because the parents would have it no other way. A reconciliation between parent ambitions and their child's abilities was impossible. Here again, is an indication that the students are immature and do not know their own minds. It is worthy to note that Alfred Kahler and Ernest Hamburger subscribe to this contention. "One of the major unsolved problems is the premature imposition of a choice of a vocation on 14-year-old children."[3]

3. The compulsory education laws work to the detriment of many students. Specifically those who are compelled to leave school because of socioeconomic conditions and those students who are forced into a situation beyond their mental capacity. No provisions are made for short terminal courses that would help these students to learn some skill or knowledge that would enable them to enter into a gainful occupation. Usually these students are compelled to enter programs that do not take into consideration their aptitude or interests, and consequently do not fit them for occupations in which they might find some degree of success and happiness. Furthermore employers are reluctant to hire young people who are forced to attend a part-time continuation school. This is especially true when there is an employers market.

Compulsory education laws are with us to stay. Through the years, education in the United States has consistently followed the same pattern; that of more education for the individual, this is one of the most fundamental expressions of the will of society. In colonial days, mastery of the fundamental subjects was considered an achievement, and formal education often ended in early life. Today compulsory education laws are continually being increased, throughout the country, compulsory school requirements range from 16 to 18 years of age. With this type of legislation confronting the educator, the only alternative is to utilize the time to the greatest advantage of the young people, and try to fit them more adequately for their future.

[3]Albert Kahler and Ernest Hamburger, *Education for an Industrial Age*, Ithaca, N. Y., 1948, p. 61.



Nonvocational Students

With the premise in mind of advancing vocational education, and serving the needs of all youths, the following plan is proposed: The 6-3-3-2 plan would provide for college preparation, business and technical training on the secondary level. These three groups would continue their studies in a public junior college pursuing their chosen curriculum. Should the student have a change of mind upon completing the twelfth grade, he could transfer to a vocational school for a two-year intensive course. Having completed their secondary school requirements, they would concentrate on vocational instruction, and spend most of the time at shopwork.

Craft Trade Students

The 6-3-2-3 plan would provide for a *Life Training Plan*. This could take one of several forms. Perhaps something on the plan of the CCC, or on a semimilitary nature. At this point, we must take into consideration the financial need of the youth's family. A precedent has been set by the CCC and NYA for student remuneration for learning. The *G.I. Bill of Rights* illustrates the increased interest in education, when the student is helped financially. If industry is reluctant to hire young people, until they are 18, which is true in many occupations, then it appears that industry should contribute more generously to keeping these young people in school, so that upon graduation they are prepared

to enter industry as producing, profitable employees.

The important feature would be that the youngster would be away from home ties; learn to live and get along with others, practice democratic living, rather than merely living under an artificial make-believe, school democracy. The program should be centered on living in a democracy with emphasis placed on exploration and prevocational training. Removing these youngsters from their environments, from their gangs, at this impressionable age of 15 and 16, will undoubtedly cut down juvenile delinquency in our cities. There is nothing that adds more to a youngster's stature, than being on his own, being independent. This exposure to life would help him realize the necessity of planning his vocational career carefully.

Semiskilled Trades Students

The 6-3-3-2 plan provides for those that want a minimum of formal education. Based on a similar program as the previous one, the emphasis should be placed on prevocational and the exploratory phase of work. The exploratory part of the program must be presented in its broadest sense, to include both the industrial and agricultural worlds. The entire curriculum must be of a functional nature, a self-sufficient program, where students operate their own enterprises, learning while they earn, and earning while they learn. The type of vocations that this group would be interested in, could undoubtedly be taught in one or two years.

The proposed plan has several other advantages, which would help solve many of our vocational problems today. Using vocational education as a specialized field in the twelfth, thirteenth, and fourteenth grades, and using subject matter only as it related to the trade, would greatly eliminate the problem of academic subjects. This is one of our major problems. Vocational education is trying to straddle the educational fence. On one hand it is trying to duplicate the work of the academic schools, preparing students for regent examinations and attempting to provide enough credits for college entrance. While on the other hand, it is neglecting its primary purpose of "training for gainful employment." The need of a cultural education in a democratic society cannot be denied, but if our schools are unable to achieve this goal in 12 years of academic education, they are badly in need of some curriculum revision.

The above is a rather revolutionary idea in attempting to solve the problems of vocational education. It is by no means complete, nor is it impregnable. Nevertheless, it will present the problem for discussion and only by consideration of the problem, discussion and debate, can we do a better job for all our pupils.

The Internal Problem

The objectives of vocational education are the pillars on which we build our school curriculum. The emphasis today is placed on those experiences which are essential to the individual for his development as a worker, consumer, and citizen. In a democracy, these are worthy objectives indeed, but in the proposed plan, two extra years are provided in the life training area for the development of these specific needs. The years allotted to vocational education, therefore could be concentrated on trade training, and hence accomplish their objective more efficiently in a shorter period of time.

There is a definite need for constant evaluation of the course of study. In one school system's Curriculum Bulletin, we find listed, "Sculpture and Stone Carving" as a three-year course. There is no doubt that we all appreciate and admire creative sculpture, but the question arises whether this activity warrants a three-year course at public expense? Many of the present courses are padded to fit into the established three years of vocational training. In one particular field, students are compelled to take a course that they will not apply until they have at least ten years of trade experience. This course is built on antiquated trade procedures, and is a far cry from modern methods of production. It is the responsibility of the vocational schools to keep abreast of technological changes, and to add or eliminate courses to meet the changing demands of society and the needs of our students.

The program must be adapted to provide training for approximately 60 per cent of youth who will become routine workers in industrial and business establishments. Adjustments must be made which will enable vocational schools to provide these youths with training designed to develop desirable work habits. Analyses and surveys must be conducted to find just what fields of employment are open to this group of students and what will be required of them. Instead of throwing them into a three-year course which is unsuited to their interests, aptitudes, or capacities, one- and two-year terminal courses must be established in these areas where they will find employment, success, and happiness.

Methods of teaching vocational subjects, will in many instances hew from the traditional shopwork pattern. Greater use should be made of the part-time co-operative program. However, it must be established on a sound basis because a poorly organized co-operative program lends itself to exploitation of youth by both the school and the employer. There is a definite need for a part-time preparatory program to provide for entrance into an occupation other than the one in which the worker is engaged. In addition, this program would serve out-of-school youth who are seeking employment. This need is not provided for in evening extension training, which is governed by Smith-Hughes funds and is open to people employed in the specific field only.

Finally, we are concerned with our sales. What is happening to our product? Does it meet the requirements of industry? How can we improve upon it? As in any other enterprise, our success depends on the acceptance of our product, and in the knowledge that we have adequately and competently equipped our youth, to take their rightful place in an ever changing society, to take their place as self-reliant, self-supporting citizens. The answer to these questions depends on how efficient is our placement and follow-up service. A co-ordinator contributes invaluable service to youngsters making the transition from school to industry. But, even more important than help to the students, is the help that the school itself may get from follow-up studies in planning its work for the future. "The percentage of placement among graduates from each of the school's curriculums, the time elapsed between graduation and placement, the nature of the jobs held, the comments of employers on the competence of students hired, and the everlasting problem of what happens to the dropouts, all contribute information that may be invaluable to the administrator in planning the program that will be offered

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Trouble Areas in Training To Overcome Vocational Handicaps

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Many people who enter training to overcome vocational handicaps do not accomplish their vocational objectives, according to a study of 10,653 trainees of whom 1652 or 15 per cent had *dropped out* before completing their courses. Further information received since completion of the study reveals that approximately 30 per cent of the World War II veterans who have entered training to overcome vocational handicaps resulting from service incurred disabilities have dropped out without completing their training programs. More than 80 per cent of the total number who are no longer in training failed to accomplish their occupational objective; that is, less than 20 per cent have been rehabilitated. The causes range all the way from sickness to neglect, and from poor advisement to inadequate training program. Some, of course, have become employable without the necessity of completing their training.

However, the study was more concerned with the discovery of conditions under which *dropouts* occur than it was with the ratio of *dropouts* to enrollees. Consequently, the purpose of this report is to present such data concerning *dropouts* and their fellow trainees, who were remaining in their courses, as are believed to be helpful in revealing *trouble areas* which are of interest to all persons concerned with the rehabilitation of the vocationally handicapped, and are in positions to take corrective action before dropouts occur.

At the present time, there are two federally aided programs of vocational rehabilitation in the United States. The Veterans Administration is legally responsible for the administration of Public Law 16, 78th Congress, which provides for the rehabilitation of veterans of World War II with service incurred disabilities resulting in vocational handicaps. The Federal Security Agency administers the vocational rehabilitation act of 1920, amended by Public Law 113, 78th Congress, 1943, which provides for the rehabilitation of civilians disabled in industrial accidents and otherwise. In both of these programs the actual training to overcome the vocational handicap is carried out by state and local education and training establishments rather than by establisments especially set up or operated by the federal agency responsible for the over-all administration of provisions of the law.

The discovery of causative conditions under which rehabilitation trainees are most likely to *drop out* and the application of such knowledge before the *dropouts* occur is of concern to both the federal authorities administering the laws and the state and local authorities doing the training. The federal agency can aid in compiling data revealing *trouble areas*. The state and local authorities through *on-the-spot* observations can more readily discover the innumerable underlying factors which may be contributory within each *trouble area*. They are also in the best position to take corrective action. The present report does not go beyond the presentation of data which are helpful in revealing trouble areas. The data were obtained from Veterans Administration Regional Offices in 36 states where special reports were made on 1652 individual dropouts from a group of 10,653 rehabilitation trainees. Data from the individual record cards of the entire group were made available in the Central Office at Washington, D. C. Release of the information compiled and presented herein was approved by the Information Service. However, this splendid co-operation should not be construed as making the Veterans Administration responsible for the accuracy or reliability of any of the data presented herein. Likewise, opinions or conclusions stated or implied are not necessarily attributable to the Veterans Administration.

The most significant facts revealed by the study are:

1. The probability that a trainee will stay in vocational rehabilitation training until his objective has been reached tends to diminish in direct proportion to his age upon entrance into training.

2. The educational level which the trainee reached prior to entrance into vocational rehabilitation training is significant. The tendency to drop out decreases in inverse ratio to the amount of previous education attained. This raises a question as to whether more attention should be given to gearing vocational rehabilitation courses to the educational levels of individual trainees.

3. The most critical period in a trainee's vocational rehabilitation with respect to tendency to drop out is the first six months.

4. A great deal more vigilance is necessary in planning and executing training programs of the less standardized type of course than is necessary with curricula such as offered by professional and semi-professional schools that set up prerequisites and cater to a selected group of students.

5. The dropouts are a great deal more frequent among trainees who are pursuing their training in on-the-job facilities than in schools and colleges or in a combination of on-the-job and school or college facilities. There is the least tendency for trainees to *drop out* of training when a combination of facilities is used, such as in the case of co-operative courses.

6. In only a few cases do trainees, who are reported to have dropped out of training because of getting a job or going to work for themselves, go into occupations from which their income is in excess of

TABLE I. BASIC INFORMATION RELATIVE TO 10,653 VOCATIONAL REHABILITATION TRAINEES OF WHOM 1,652 DROPPED OUT BEFORE COMPLETING THEIR COURSES OF TRAINING

ITEMS OF COMPARISON	TOTAL CASES REPORTED		DROPOUTS		
			By Categories		Percentages of Totals in Col. (1)
	No.	Per Cent	No.	Per Cent	
	(1)	(2)	(3)	(4)	(5)
TOTAL CASES REPORTED	10,653	100.0	1,652	100.0	15.5
1. Age upon entrance into training –					
Under 20	553	5.2	65	3.9	11.8
20–24	5,208	48.9	712	43.1	13.7
25–29	2,791	26.2	454	27.5	16.3
30–34	1,108	10.4	214	13.0	19.3
35–39	687	6.5	121	7.3	17.6
40–44	183	1.7	41	2.5	22.4
45–49	88	0.8	22	1.3	25.0
50 and over	15	0.1	3	0.2	20.0
Not available	20	0.2	20	1.2	100.0
2. Military Rank –					
Commissioned	94	0.9	9	0.5	9.6
Non-commissioned	10,559	99.1	1,643	99.5	15.6
3. Length of service –					
Less than 3 months	106	1.0	17	1.0	16.0
3 months but less than 6 months	827	7.8	121	7.3	14.6
6 months but less than 9 months	1,242	11.7	204	12.4	16.4
9 months but less than 12 months	1,414	13.3	217	13.1	15.4
12 months but less than 15 months	1,324	12.4	217	13.1	16.4
15 months but less than 18 months	1,090	10.2	132	8.0	12.1
18 months but less than 21 months	937	8.8	112	6.8	12.0
21 months but less than 2 years	709	6.6	109	6.6	15.4
2 years but less than 3 years	1,800	16.9	296	17.9	16.4
3 years but less than 5 years	1,048	9.8	188	11.4	17.9
5 years and over	136	1.3	19	1.2	14.0
Not available	20	0.2	20	1.2	100.0
4. Previous Education completed –					
a. Elementary					
One or two grades	25	0.2	7	0.4	28.0
Three or four grades	181	1.7	58	3.5	32.0
Five or six grades	426	4.0	116	7.0	27.2
Seven or eight grades	1,634	15.4	423	25.6	25.9
b. High School					
One or two years	1,808	17.0	401	24.3	22.2
Three or four years	4,685	44.0	505	30.6	10.8
c. College					
One year	771	7.2	50	3.0	6.5
Two years	579	5.4	43	2.6	7.4
Three years	242	2.3	15	0.9	6.2
Four years	191	1.8	17	1.1	8.9
Post graduate	33	0.3	5	0.3	15.2
d. Not stated	78	0.7	12	0.7	15.4
5. Disability connected with –					
Combat	1,082	10.1	171	10.3	15.8
Non-combat	5,002	47.0	551	33.4	11.0
Not stated	4,569	42.9	930	56.3	20.4
6. Type and Degree of Disability –					
a. Tuberculosis	165	1.5	32	1.9	19.4
0%	1	0.0	1	0.1	100.0
10%	1	0.0	0	0.0	0.0
20%	1	0.0	1	0.1	100.0
30%	8	0.1	2	0.1	25.0
40%	1	0.0	0	0.0	0.0
50%	70	0.7	9	0.5	12.9
60%	2	0.0	0	0.0	0.0
70%	24	0.2	6	0.4	25.0
80%	2	0.0	1	0.1	50.0
90%	1	0.0	0	0.0	0.0
100%	53	0.5	12	0.7	22.6
Retired Officers' Pay	1	0.0	0	0.0	0.0
b. Neuropsychiatric	3,657	34.3	550	33.3	15.0
0%	3	0.0	0	0.0	0.0
10%	663	6.2	82	5.0	12.4
20%	243	2.3	33	2.0	13.6
30%	1,408	13.2	218	13.2	15.5
40%	286	2.7	42	2.5	14.7
50%	759	7.1	129	7.8	17.0
60%	114	1.1	14	0.8	12.3
70%	65	0.6	8	0.5	12.3
80%	27	0.3	4	0.2	14.8
90%	4	0.0	0	0.0	0.0
100%	75	0.7	19	1.2	25.3
Retired Officers' Pay	10	0.1	1	0.1	10.0
c. Medical and Surgical	6,831	64.1	1,070	64.8	15.7
0%	11	0.1	5	0.3	45.5
10%	1,546	14.5	211	12.8	13.7
20%	1,193	11.2	191	11.6	16.0
30%	2,427	22.8	372	22.5	15.3
40%	553	5.2	105	6.3	19.0
50%	453	4.1	51	3.1	11.7
60%	393	3.7	71	4.3	18.1
70%	61	0.6	11	0.7	18.0
80%	77	0.7	20	1.2	26.0
90%	5	0.0	0	0.0	0.0
100%	117	1.1	32	1.9	27.4
Retired Officers' Pay	13	0.1	1	0.1	7.7
7. Time in Rehabilitation Training –					
Less than 1 month	1,759	16.5	482	29.2	27.4
1 month but less than 2 months	1,845	17.3	383	23.2	20.8
2 months but less than 3 months	2,742	25.8	217	13.1	7.9
3 months but less than 6 months	2,183	20.5	365	22.1	16.7
6 months but less than 9 months	1,240	11.6	112	6.8	9.0
9 months but less than 12 months	600	5.6	33	2.0	5.5
12 months or more	235	2.2	11	0.6	4.7
Not stated	49	0.5	49	3.0	0.0
8. Action initiated by –					
Motion of Training Facility	Not Applicable		147	8.9	Not Applicable
Motion of Rehabilitation Agency			286	17.3	
Trainee Voluntarily			1,085	65.7	
Motion of Training Facility and Rehabilitation Agency			15	0.9	
Motion of Training Facility and Trainee Voluntarily			4	0.2	
Motion of Rehab. Agency and Trainee Voluntarily			7	0.4	
Motion of Tr. Fac. Rehab. Agency and Trainee Voluntarily			1	0.1	
Military Service			1	0.1	
Not stated			106	6.4	
9. Type of Training Facility –	3,066	28.8	669	40.5	21.8
a. On-the-job			74	4.5	
Self proprietorship			59	3.6	
Indentured apprenticeship			534	32.3	
Non-indentured trainee			2	0.1	
Not stated	6,900	64.8	874	52.9	12.7
b. Institutional			441	26.7	
Public			429	26.0	
Private			0	0.0	
Correspondence			3	0.2	
Public and Private			1	0.0	
Public and Correspondence	644	6.0	66	4.0	10.2
c. Combination of Job and Institutional	43	0.4	43	2.6	100.0
d. Not stated					
10. Field of Training –					
Professional and Managerial	5,504	51.7	493	29.8	9.0
Clerical and Sales	898	8.4	182	11.0	20.3
Service	159	1.5	39	2.4	24.5
Agriculture and Kindred	285	2.7	83	5.0	29.3
Trade and Industrial	3,808	35.7	855	51.8	22.5
Miscellaneous	1	0.0	0	0.0	0.0

Trouble areas in training

the income they received while in training. In only a few cases do they go into occupations for which they are fully trained and qualified. In most cases they go into a field of work other than that of the occupational objective of their vocational rehabilitation course.

7. There is very little correlation between per cent of disability and tendency to drop out of courses of vocational rehabilitation training when the disability is under 80 per cent. There is a definite increase in dropouts among those with 80 per cent or more disability as compared with others.

8. The tendency to drop out of training is more frequent among trainees with tuberculosis than among those with any other disability.

9. The causative condition which obtains in the greatest number of cases is *unsatisfactory progress*. The most frequently stated causes of unsatisfactory progress are: (1) The trainee failed to apply himself. (2) The occupational objective was unsatisfactory. This and other data raise a question as to whether sufficient attention is given to possible need for change of occupational objective.

10. Ailments which developed after the trainee entered training are reported as causative in the second highest number of cases. By far the greater number of these ailments are related to service connected disabilities.

Data relative to the entire group of 10,653 vocational rehabilitation trainees from which 1652 dropped out before completing their courses of training, is presented in Table I.

1. *Age Upon Entrance Into Training:* Three per cent of the trainees were over forty years of age upon entrance into training, whereas 5 per cent of those who dropped out were over that age upon entrance into training. In other words the older men appear more frequently (by 2 per cent) among the dropouts than among the entire group entering training. At the other end of the age scale it is noted that 5 per cent of the men were under 20 years of age upon entrance into training, whereas this age group is 4 per cent of the dropouts. The largest single age group entering training is 20–24 years of age (49 per cent). This group is represented less frequently (by 6 per cent) among the dropouts than among the total number entering training. The study shows that the per cent of trainees *lost* increases in direct proportion to age upon entrance into training. This study does not attempt to discover the cause. Its purpose is to point out *trouble areas* that might well be given special attention in the interest of holding trainees until fully rehabilitated.

2. *Military Rank:* The distribution of trainees by rank while in the military or naval service is the same for the entire group of 10,653 as it is for the 1652 who dropped out — 1 per cent commissioned, 99 per cent noncommissioned.[1] However there is a marked contrast between the percentage of dropouts among the commissioned and noncommissioned men — 10 per cent for the commissioned and 15.6 per cent for the noncommissioned men.

3. *Length of Service:* Length of time in military or naval service appears to bear no relationship to tendency to *drop out* of training. The distribution of trainees by length of time in service is observed to be approximately the same for the entire group of 10,653 trainees as for the 1652 who did not complete their courses. There seems to be no significant relationship between the length of time in service and percentage of dropouts.

4. *Previous Education Completed:* A very definite and marked relationship obtains between the previous education of a trainee and the likelihood of his continuing in training until the completion of his course. Twenty-seven per cent of those with no more than an elementary school education drop out, as compared with 14 per cent of those who have previously gone to high school, and 8 per cent of those who have previously been in college. On the basis of these data it appears that the trainees who enter vocational rehabilitation courses with the least amount of previous education will require the greatest amount of time and care if they are to be rehabilitated. The elementary education group represents only 22 per cent of the number who entered training, but the dropouts in this group are higher by 21 per cent than those in the high school group which represent 61 per cent of the total number who entered training. The situation may be due to the same factors which prevented the trainee from having previously reached a higher level of education. Some of those factors may be limitations on the part of the individuals and some may be inadequacies on the part of the schools. This study does not reveal the cause. It only shows that here is a *trouble area* that deserves careful consideration as to whether courses of training are geared to the previous education and training of the individual trainee or whether some other causative condition prevails.

5. *Disability Connected With Combat or Noncombat Service:* Although the study reveals no real significance in the fact, the percentage of dropouts among trainees who received their disabilities in military or naval combat is 15.8 as compared with 11.0 among those whose disabilities were not received in combat. When the study was planned it was hoped that information could be obtained regarding the relationship of a sustained period of combat experience and tendency to drop out of training. Since the information was not readily obtainable the individual case reports showed only whether or not the veteran's disability was received in combat and gave no information regarding the combat engagements participated in or the duration of that participation.

6. *Type and Degree of Disability:* There is a variation of only 1 per cent between the distribution of the 10,653 trainees in the entire group and the 1652 dropouts on the basis of type of disability. However, dropouts among the tubercular cases are higher by 4.5 per cent than among the neuropsychiatric cases, and higher by 3.4 per cent than among the medical and surgical cases. No relationship appears to obtain between degree of disability and tendency to drop out below 80 per cent disability. But there is a marked increase in the percentage of dropouts among trainees with 80 per cent or more disability.

7. *Time in Rehabilitation Training:* In 54 per cent of the 1652 cases of dropout the trainees were in training no longer than one month. Eighty per cent were in training no longer than six months. These data appear to indicate that the first few months of training are most critical and should be given particular attention.

8. *Action Initiated by Whom:* In 66 per cent of the cases the action relative to effecting the dropout was initiated by the trainee. In 17 per cent of the cases the action was initiated by the agency responsible for the rehabilitation, in 9 per cent by the training facility, and in 8 per cent jointly by two or more of the three parties concerned. One might draw the hasty conclusion that, since in 66 per cent of the cases the action was initiated by the trainee, there must be many training programs that are unsatisfactory to the trainees. However, an examination of Table II, "Causative Conditions Relative to 1652 Cases in Which Trainees Dropped Out of Courses of Vocational Rehabilitation Training," which will be discussed later, reveals that a trainee who is well satisfied with his training program may drop out for such reasons as family situation and medical developments.

9. *Type of Training Facility:* There is

[1]Includes all *enlisted men*.

considerable contrast between the percentage distribution of the entire group of 10,653 trainees and of the 1652 dropouts on the basis of type of training facility. Sixty-five per cent of the entire group were enrolled in institutional training, whereas only 54 per cent of the dropouts were in this classification. Twenty-nine per cent of the entire group were in on-the-job training which classification comprised 42 per cent of those who dropped out. In other words the on-the-job trainees were 13 per cent more among the dropouts than among the total group of trainees. Where a combination of institutional and on-the-job facilities obtains the trainees involved were 2 per cent less among the dropouts than among the entire group. Twenty-one and eight tenths per cent of the veterans in on-the-job training dropped out, whereas only 12.7 per cent of those in institutional training and 10.2 per cent of those using a combination of facilities were in this group.

It appears to be evident that on-the-job training programs should be given careful study to determine their adequacy for the trainee in the light of this previous education, experience, and aptitude. A spot check of the individual reports received indicated that one of the basic reasons for loss of trainees in on-the-job training courses may be a failure to take into consideration the individual's lack of previous education, when planning and executing his training program. This idea is consistent with the fact that there is a higher percentage of dropouts among those with no more than an elementary school education than from other educational-level groups.

10. *Field of Training:* The field of training from which the highest per cent of trainees dropped out is agriculture (29.3), according to data gathered at the time the present study was made. However, after agriculture training for veterans on farms was set up in the several states on the Institutional On-Farm plan described in Public Law 377, 80th Congress, it is logical to assume that in the future this field of training may have the lowest per cent of dropouts, since there are fewer dropouts when such combinations of institutional and on-the-job facilities are used. The percentages of those in other training fields whose courses were not completed are:

Service occupations, 24.5 per cent

TABLE II. CAUSATIVE CONDITIONS RELATIVE TO 1,652 CASES IN WHICH TRAINEES DROPPED OUT OF COURSES OF VOCATIONAL REHABILITATION

CAUSATIVE CONDITIONS	Number (1)	Per Cent (2)
TOTAL CASES REPORTED	1,652	100.0
A. Disciplinary Matters	459	27.8
1. Excessive absence	334	20.2
2. Misconduct	86	5.2
3. Misrepresentations by trainee	11	0.7
4. Other	65	3.9
B. Family Situation	327	19.8
1. Sickness in home	71	4.3
2. Distance from home	58	3.5
3. Financial difficulties	143	8.7
4. Marital difficulties	48	2.9
5. Other	79	4.8
C. Out of Contact	354	21.4
1. Moved to other territory	81	4.9
2. Left without notice	257	15.6
3. Other	58	3.5
D. Medical Developments after Entering Training	489	29.6
1. Related to service-connected disability	406	24.6
2. Not related to service-connected disability	79	4.8
3. Injury received in connection with training	6	0.4
E. Closing of School for Vacation	30	1.8
F. Trainee Desired Rest	147	8.9
G. Progress Unsatisfactory because of:	644	39.0
1. Trainee's failure to apply himself	361	21.9
2. Unable to make satisfactory personality adjustment	132	8.0
3. Disliked personnel of training facility	43	2.6
4. Substandard or unsatisfactory training facility in judgment of rehabilitation agency as to:	19	1.2
a. Space	1	0.0
b. Equipment	2	0.1
c. Instructional material	10	0.6
d. Personnel to conduct required courses	11	0.7
5. Unsatisfactory occupational objective in judgment of rehabilitation agency	349	21.1
a. Entered upon training for occupation in which he had no interest	16	1.0
b. Developed a dislike for the type of work	54	3.3
c. Not capable of pursuing course because of:		
1. Physical handicap	187	11.3
2. Lack of aptitude	88	5.3
d. Occupational objective not compatible with trainee's education or training and skills	36	2.2
e. Tenure of occupation questionable	7	0.4
H. Trainee Believed Opportunities in Occupation to Be Dubious with Respect to:	28	1.7
1. Tenure	9	0.5
2. Advancement compatible with his abilities	20	1.2
I. Trainee Got Job or Went to Work for Himself	451	27.3
1. In same occupation as his objective	46	2.8
2. In same general field as his occupational objective and compatible with his objective	59	3.6
3. In same general field as his occupational objective but not compatible with his objective	26	1.6
4. In occupational field other than that of his objective	229	13.9
5. In occupation followed before entering military service	60	3.6
6. In which employed prior to entering training	51	3.1
7. For which he is fully trained and capable of handling	43	2.6
8. For which he is not trained	97	5.9
9. In which tenure is considered dubious	84	5.1
10. In which his tenure is considered secure	51	3.1
11. In which his opportunities are believed to be compatible with his education or training and skills	80	4.8
12. In which his opportunities are not believed to be compatible with his education or training and skills	27	1.6
13. In which his earnings are in excess of his earnings and increased pension while in training	115	7.0

Trouble areas in training

Trade and industrial occupations, 22.5 per cent

Clerical and sales occupations, 20.3 per cent

Professional and managerial occupations, 9.0 per cent.

Since considerable education is prerequisite to enrollment in professional and managerial courses, it is not surprising that the low percentage of dropouts in this field correlates rather highly with the low percentage of dropouts among trainees with considerable previous education as shown in Item 4 of Table I.

Although no claim is made that the present study has produced conclusive evidence, it appears to indicate that the highest per cent of dropouts can be expected in those fields of training in which there is a high proportion of special-type courses enrolling trainees of varied backgrounds, as compared with the more standardized curricula of professional and semiprofessional schools that set up definite educational prerequisites and cater to a more selected group of students. The significant thing is that a great deal more vigilance is necessary in planning and executing the training programs of the less standardized type of course than for the other.

The data relative to *causative conditions* which were pertinent factors in the 1652 cases in which trainees dropped out of courses of vocational rehabilitation are presented in Table II. Nine major causative conditions are shown on the left-hand side of the table. These major conditions are identified by the letters *A* to *I* and the subordinate conditions appearing thereunder are numbered consecutively 1, 2, 3, etc., while further breakdown is indicated by small letters *a*, *b*, *c*, etc. Column (1) shows the number of cases in which each of the major conditions or subordinate factors obtained. It should be borne in mind that more than one causative condition often obtained in a single dropout

case and, therefore, the total of the figures in column (1) is not equal to the total number of cases studied. Column (2) shows what per cent each number in column (1) is of the total 1652 cases.

The findings of the study relative to causative conditions which were pertinent in the cases in which trainees dropped out of vocational rehabilitation training are discussed as follows:

a) *Disciplinary Matters:* Disciplinary matters (Item A, Table II) were reported as Causative Conditions in 27.8 per cent of the cases studied. Excessive absence was reported as being a disciplinary matter in 20.2 per cent of the 1652 cases. There is no way of determining from Table II whether excessive absence was a result of more basic causes such as sickness or family troubles. Causative conditions *A. 2 misconduct* and *A. 3 misrepresentation by the trainee* were factors in only 5.9 per cent of the cases. Misconduct was reported in 5.2 per cent of the cases and misrepresentation by the trainee in .7 per cent of the cases. Dishonesty, as revealed in *A. 2.* "Misrepresentation by trainee" appeared in only seven tenths of one per cent of the dropout cases, and involved only one tenth of one per cent of the total group of 10,653 who entered training. It is evident therefore, that the 27.8 per cent mentioned is not indicative of a disciplinary problem of consequence in connection with vocational rehabilitation training.

b) *Family Situation:* In 19.8 per cent of the cases studied *family situation* was indicated as a factor contributing to dropping out of training. Financial difficulties were most frequent, existing in 8.7 per cent of the cases, while other causes reported were sickness in the home (4.3 per cent), distance from home (3.5 per cent), marital difficulties (2.9 per cent), and other miscellaneous causes (4.8 per cent).

c) *Out of Contact:* In 21.4 per cent of the cases it was reported that the trainee had been considered as dropped out because of being out of contact. In 15.6 per cent of the 1652 cases the trainee left his training without notice. Four and nine tenths per cent of the 1652 trainees moved out of the territory of the rehabilitation agency field office, apparently without requesting a transfer.

d) *Medical Developments After Entering Training:* Developments requiring medical attention were reported as causative in 29.6 per cent of the cases. In 24.6 per cent or approximately one fourth of the 1652 cases the medical developments were related to service connected disability. Ailments not attributed to service connected disability were reported as a cause in 4.8 per cent of the cases. In .4 per cent of the cases injury received during training was reported as a cause.

e) *Closing of School for Vacation:* Closing of school for vacation was reported as reason for trainee being *out of training* in 30 cases or 1.8 per cent of the total. The significant fact is that the figure is too low for this causative condition to be considered as making any significant contribution to the number of cases reported as dropped out.

f) *Trainee's Desire for Rest:* One hundred and forty-seven, or 8.9 per cent of the 1652 trainees who dropped out of their courses, were reported to have done so because of a desire for a rest. It is not possible in this report to go into the factors which may have produced the desire. A study of the individual case reports is somewhat revealing in some instances, but there are not sufficient data upon which to base any general conclusion regarding all cases.

g) *Unsatisfactory Progress:* Unsatisfactory progress was a causative condition in 39 per cent of the cases. One or more of the five factors under this division of Table II obtained in each of these cases. The percentage of the 1652 cases in which each factor did obtain is as follows: (1) trainee failed to apply himself — 21.9 per cent; (2) unable to make satisfactory personality adjustment — 8.0 per cent; (3) disliked personnel of training facility — 2.6 per cent; (4) substandard or unsatisfactory training facility — 1.2 per cent; (5) unsatisfactory occupational objective — 21.1 per cent. Additional information relative to (4) and (5) above can be found in Table II.

h) *Trainee's Belief That Opportunities in Occupation Were Dubious:* In 1.7 per cent of the 1652 cases studied the trainee who dropped out believed that his opportunities in the occupation for which he was training were limited with respect to tenure or advancement compatible with his abilities or both. Dissatisfaction with the prospects in regard to tenure was mentioned in .5 per cent of the 1652 cases and advancement in 1.2 per cent.

i) *Obtaining of Job or Self-Employment:* In 27.3 per cent of the 1652 individual reports on reasons for dropping out of training it was indicated that the trainee got a job or went to work for himself. An examination of the more detailed information under part I of Table II warrants the following significant observations: (*a*) In most cases the veteran went into a field of work other than that of the occupational objective for which he was being trained. (*b*) In only a few cases did the trainee go into an occupation from which his income was in excess of his income while in training. (*c*) In only a few cases did the veteran enter an occupation for which he was fully trained and qualified.

Bookbinding in the graphic-arts department, Tucson Senior High School, Tucson, Ariz.

— Submitted by Harry A. Goldstein, instructor of photography

A Scheduling Board

FRED A. BAER
Instructor of Electricity
Bret Harte Junior High School
Los Angeles, Calif.

Teachers of industrial arts have used various methods of checking themselves on their success in covering the course of study; each has organized it for himself, or follows the suggestions of the curriculum office of the school system. One method is to keep a book in which the teacher lists the demonstrations and lessons to be given and checks them off as they are taught.

This method was used by the author but it is only partially adequate. It lacks certain over-all workability because of the interruptions in the daily school program to which the teacher finds he must adjust his daily instructional plan. Varying rate of accomplishment by various classes is also a problem under this method.

Fig. 1. Title of unit glued to wooden block

All teachers are familiar with the unscheduled assemblies, rehearsals, meetings, and other impromptu school diversions that make it impossible to carry out the planned unit of work as it is scheduled. For example, the instructor had intended to give a demonstration to each of his five classes during the day, the first three were conducted as planned, but a special assembly or other meeting has taken up the entire fourth period. Of course the instructor

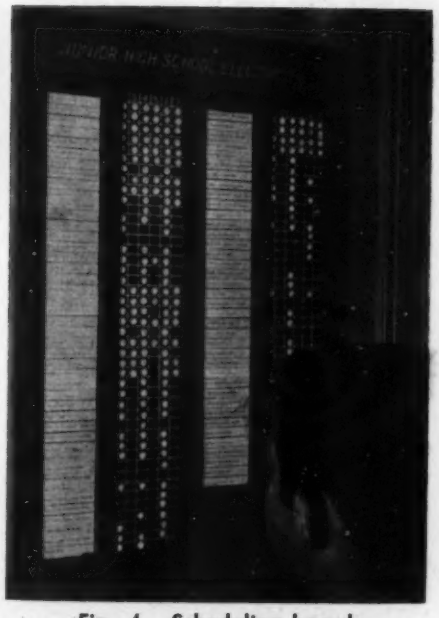


Fig. 4. Scheduling board in use

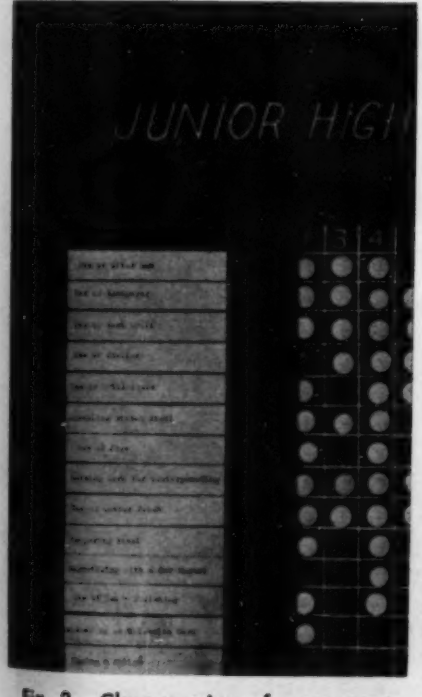


Fig. 2. Close-up view of one corner of the scheduling board

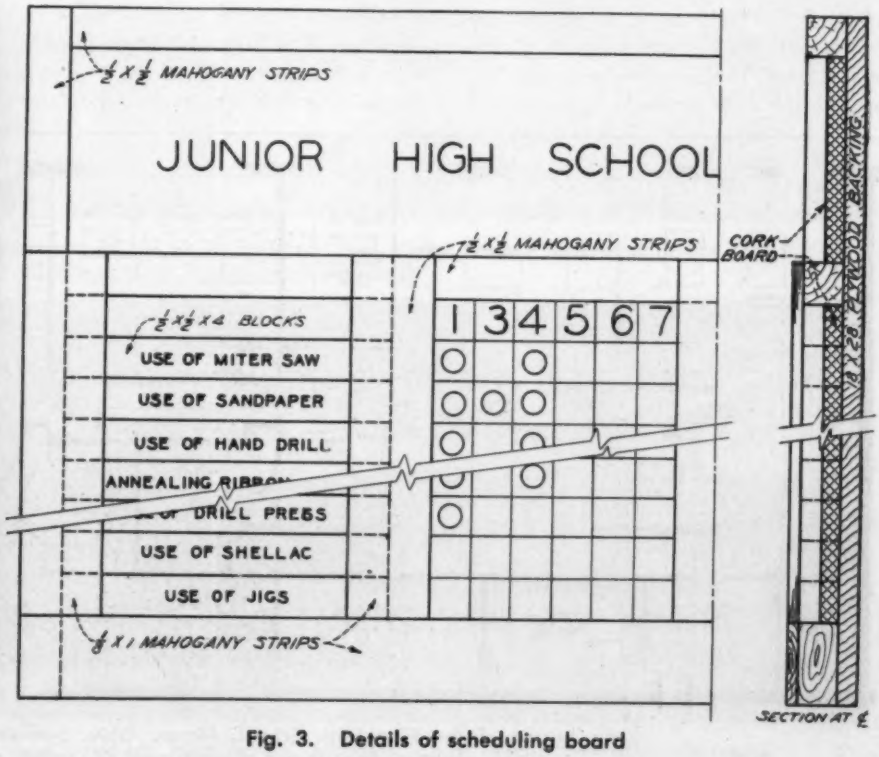


Fig. 3. Details of scheduling board

notes this in his book, but a week later is somewhat dismayed when, on correcting one of his fourth-period students in the techniques shown by the preceding week's demonstration, he discovers his omission of material in that fourth-period class.

Situations such as this make evident the need for a teaching aid that would adapt the daily work plan to interruptions and varying rates of progress. The teaching aid must show what has been taught and what remains to be taught for each period without voluminous paper work.

To meet this problem a scheduling board was devised that would indicate at a glance:

1. Lessons, demonstrations, and tests to be presented to every class in sequence of presentation.
2. Periods during which the material is to be given.
3. Which lessons have been given to any one period.

Furthermore, the board would show visitors as well as students of different classes what has been covered and what lessons are to be given in the future.

The board as finally evolved was made up of titles of units typed on white paper glued to small wooden blocks. See Figure 1. These titled blocks are held in a vertical pile against a plywood backing by means of narrow strips of thin wood. To the right of these blocks, a series of squares are drawn with white poster paint on a strip of corkboard. Horizontally the squares line up with the units on blocks and vertically with the periods taught. See Figure 2.

Checking off the units as they are covered is done by placing white thumbtacks under the appropriate period and opposite the unit under study.

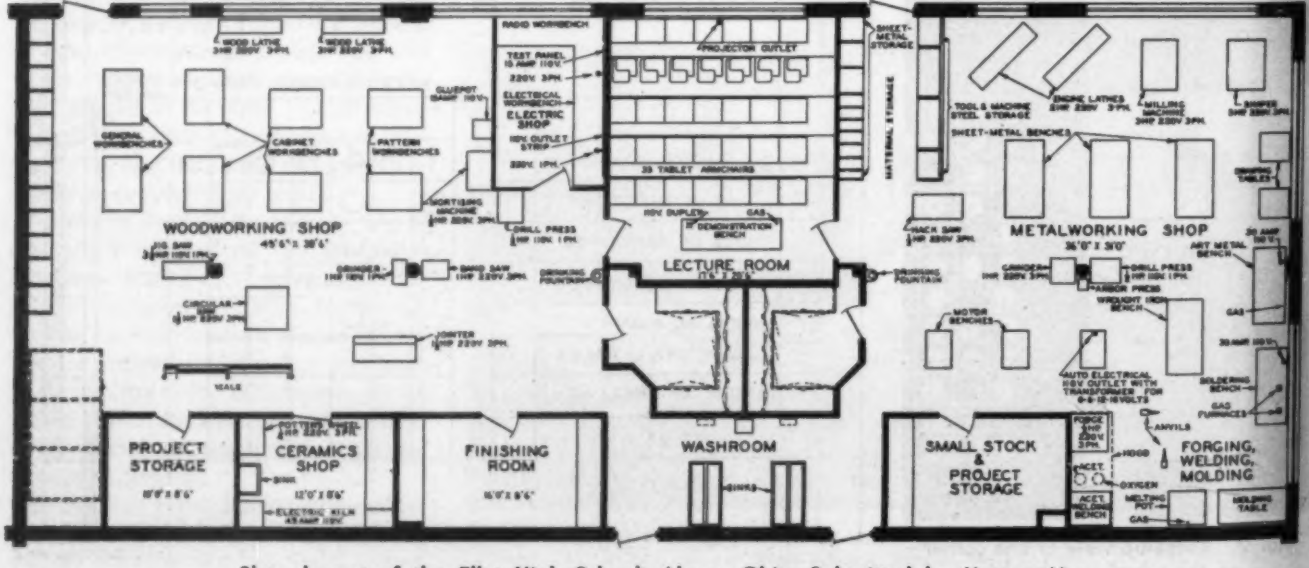
The chart is not necessarily filled solid with tacks at the end of the semester. In case of an advanced class a tack is not placed under a period opposite instruction given only to beginning classes. However, there will be tacks opposite lessons which the beginning classes do not cover. The regular course of study determines what units are to be covered by the various classes.

The students will already know which periods are the advanced and which are the beginning ones, and will learn to compare their periods only to those of a similar grade. They can also see what the advanced classes are doing and this may stimulate an interest in selection of the advanced classes as an elective for the next semester. One particularly desirable feature of this scheduling board is that at the end of the semester the instructor merely takes out all the tacks, makes any unit material changes he sees fit simply by gluing a new slip of paper on the block over the unit being replaced. Any rearrangement of the order of units to suit the instructor can be made by taking the lowest retainer strip off, since all blocks are removable from the bottom. The chart, being cleared of all tacks, is then ready for the next semester.

In building such a scheduling board for your classes, first decide how many units — such as demonstrations, tests, etc. — you wish to cover during a semester, and then make a corresponding number of blocks. A few blocks in reserve will be advisable, as you may later discover that some lessons need to be broken down in greater detail. This done, build the rack to hold all the blocks. This will vary according to the subject you teach and the number of lessons to be given; more lessons, more blocks, and a larger rack to mount them on.

The board described was made on a piece of 18 by 28-in. plywood. The blocks are ½ by ½ by 4-in. mahogany. The retainer strips holding the blocks in two columns on the plywood were made of ⅛ by 1-in. strips of mahogany. The corkboard was cut to fit in the area where tacks would be placed. The white lines and lettering may be put on with white poster paint applied with a speedball pen. The chart may also be made of metal or any other available material.

Using a hypodermic syringe to cement acrylic plastic. (Alvin R. Lappin)



Shop layout of the Ellet High School, Akron, Ohio. Submitted by Horace M. Jellison, director, department of vocational education, Akron, Ohio

Shop Units Can Be Attractive

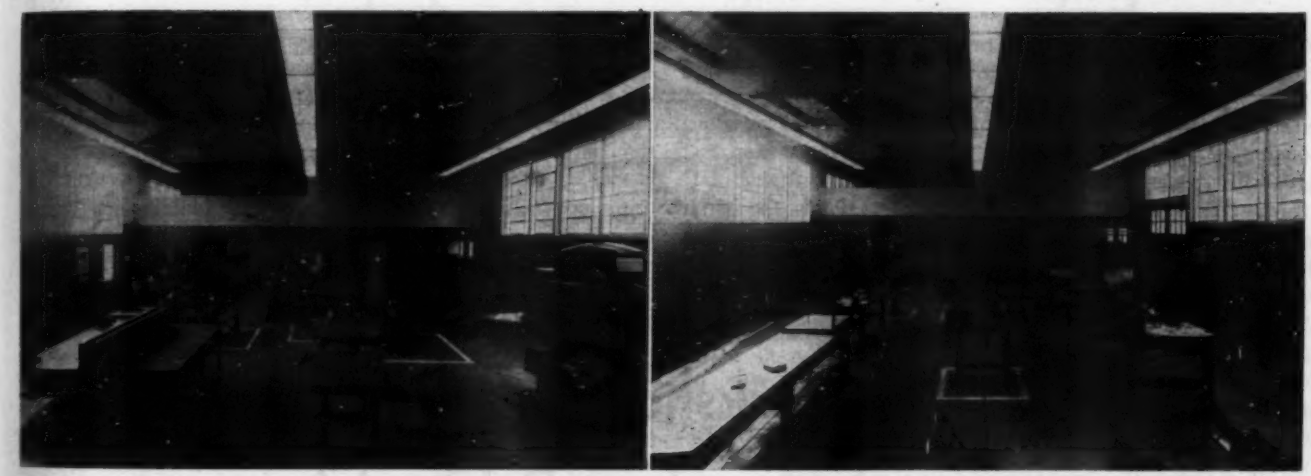
ROBERT T. ELLIOTT
Administrative Assistant
and
JAMES H. CORSON
Superintendent
Modesto City Schools
Modesto, Calif.

Main entrance, trade and industry shops, High School, Modesto, Calif.

High school shop units are frequently located at the rear end of high school sites. All too often high school shops are considered a messy and poorly kept area which should be avoided. The new shops at the Modesto High School, Modesto, Calif., have been deliberately located on a prominent corner of the high school campus and are a distinct and attractive addition to the campus area involved.

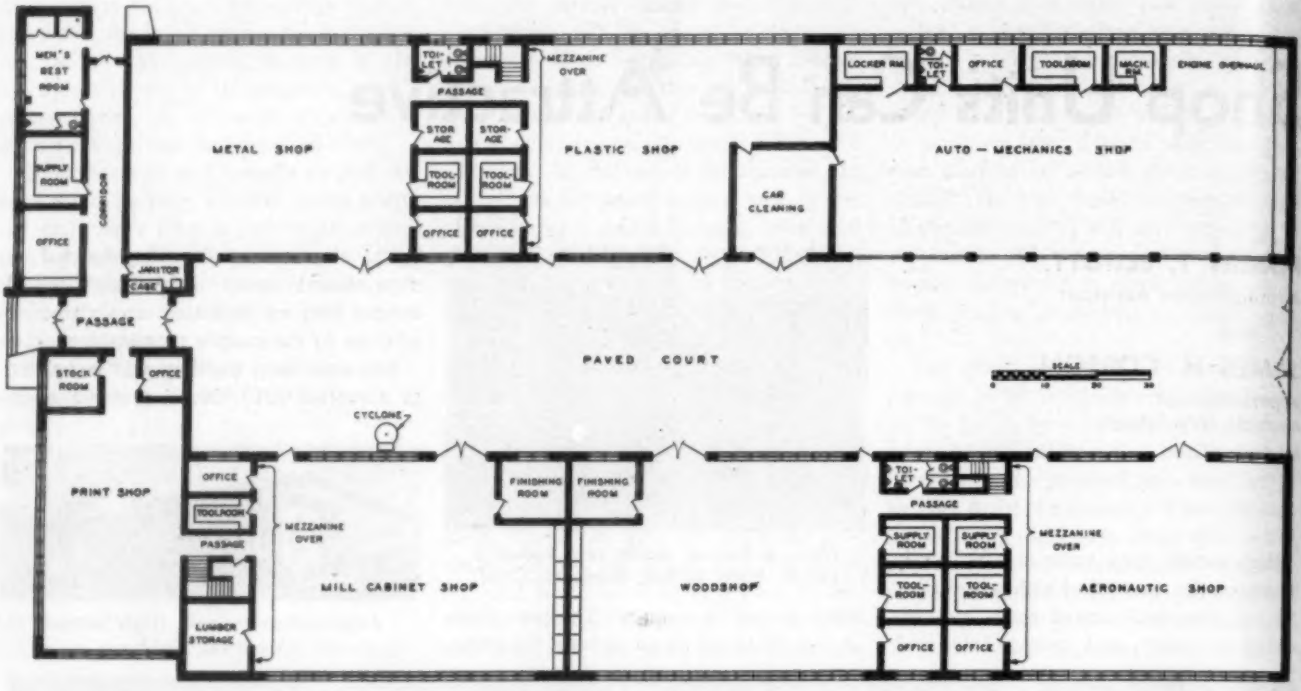
The new shop building was completed at a cost of $201,500. It provides seven

Administration unit, High School, Modesto, Calif.



(Left Industrial aeronautics department in the shop building, and (right) metals classroom in the shop building, High School, Modesto, Calif.

(Left) Plastics classroom in the shop building, High School, Modesto, Calif., and (right) shop classroom



Shop units can be attractive

large classrooms, shop administrative offices, and a men teachers lounge of 19,951 square feet, and was built at a cost of $10.09 per square foot. The Spears Construction Company of Modesto were the general contractors on the project. Harry J. Devine, A.I.A., of Sacramento, Calif., was the architect.

Each of the seven classrooms has its own storage, tool and supply, and toilet rooms. Also, there is related classroom area on the mezzanine — one to each wing of the building. Plans for each classroom have included the installation of permanent type project lockers. Adequate public utility connections for the various benches and machinery used in typical shops have been installed as well as an air suction system to remove dust, sawdust, and foreign particles from the air in the shops.

The building is of reinforced concrete foundation with frame and stucco type walls and roofing. The exterior of the building has been painted a soft shade of green. The interior walls of the building have been completed in a light green stain to an 8-ft. height with a light green wall paint on all exposed walls to the ceilings. Ceilings of the shops are painted white. Fluorescent light fixtures have been installed throughout all shops.

The classrooms involved in this new building have been designed to house such subjects as aeronautics, woodwork, cabinet millwork, vocational auto mechanics shop, ungraded shop, metal shop, and industrial-art print shop.

Plans for the shop project were developed under the guidance of J. K. Barnett, trade and industry supervisor for the Modesto City Schools, and David Nielsen, department chairman, with the co-operation and assistance of the teachers in the high school shop department. William Whitsell was the building inspector on the job for the Modesto City Schools. J. Wesley Berry is principal of the school.

Workshops of the Milwaukee Public Museum

FRANCIS A. HOPP
Milwaukee, Wis.

The Milwaukee Public Museum, located not far from the downtown section of the city of Milwaukee, is one of the outstanding museums in this country. It is the fourth largest museum in the United States. It is staffed with experienced, well-trained personnel who are experts in their field and who use fine equipment in the preparation of its many interesting exhibits and displays.

Every year, hundreds of thousands of people interested in history, botany, bird life, zoology, Indian lore, and curios of many types, wander along its corridors and through the many interesting and beautiful educational exhibits.

Anyone who has spent a number of interesting hours in this museum knows that to cover and see all of its exhibits on the three floors would take days to accomplish. Actually, there is so much to see that visitors don't know where to begin and usually end up by going through those displays which are of particular

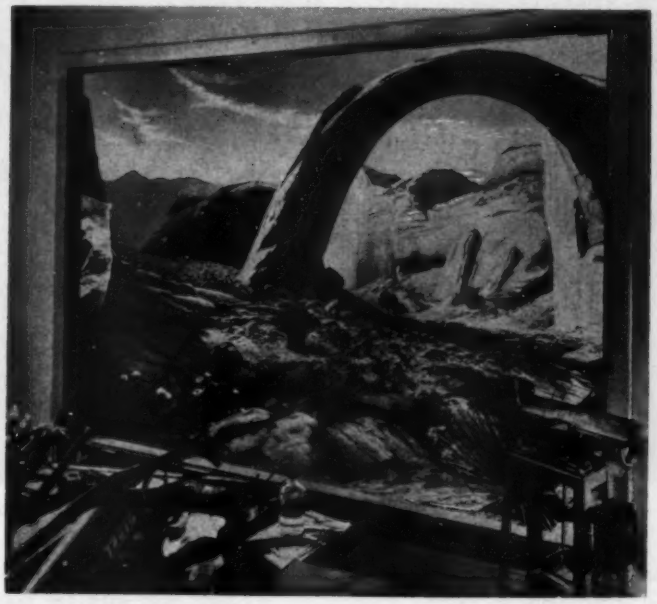


Fig. 1. Mr. Warren Dettmann working on an exhibit which will show the movements of a bird's wings in flight. Fig. 2. How backgrounds are built up

interest to them and coming back another day or two to cover other of the exhibits later on.

The men who make these exhibits must have a very broad knowledge and background. Before completing a display or exhibit, they must know everything about it, to the finest detail. It has to be right.

On a recent behind-the-scenes trip through the museum workshop, the writer saw many interesting, unusual, and enlightening things which he would like to present to the reader. It really describes the museum few ever see. Our little trip started in the vertebrate zoology department.

Vertebrate Zoology Department

This department presents all of the bird exhibits — large and small, still, and in motion. Here, too, are those bird exhibits which are part of the extension department and may be drawn out by schools and various other organizations for instructional and discussion purposes.

The vertebrate zoology department is in charge of Warren Dettmann who very generously showed us through the many departments necessary to maintain and to create the exhibits which make up the Milwaukee Public Museum. Mr. Gromme is the curator of this department.

One of the most interesting things we saw was the beginning of an exhibit which will depict many modes of flight, from the bird to the airplane. This exhibit will be placed in the bird exhibition hall. Mr. Dettmann was working on this exhibit, and the part we saw was most interesting as it will show in slow motion the actual movements of a bird's wings in flight. This is something new and the only display of its kind anywhere. A 40 to 1 ratio is used in the motor drive to give the flying movement in slow motion.

The construction of this mechanical bird is quite complex and takes many, many months of research, experimentation, and hard work. When completed, the bird will have a great horned owl head and feathers. The movements will show that a bird's wings move up and then down in a forward motion — not up and back in a rowing motion as one would expect. This movement, coupled with the angle of the wing, causes a forward lift of the entire bird body. In flight, there is always this up and down movement of the entire body, and this can be seen in the flight of many slow-moving birds.

When raising the wings, the bird folds them in a wristlike action so that there is less air pressure upward, making it less fatiguing and much easier on the bird.

At the same time, the bird spreads its feathers which allows the air to pass through the wings and then in the swift downward movement closes the feathers so the wings pocket the air and the bird gets additional pull.

Figure 1 shows that to imitate this motion will take quite a complex mechanism with a large number of parts and with much careful adjusting necessary to get the correct synchronization of the wing movements to make it true to actual bird flight actions.

A job of this sort will ordinarily take about a year to complete, that is, with the usual number of interruptions necessary to fix and repair other bird exhibits during that time. All of the little holes along the wing edges were drilled on the 14-in. Slo-Speed Delta drill press shown. These were put in to lighten the wings for easier operation. Individual holes had to be drilled for mounting the wing feathers, each of which is mounted separately to allow for the individual movement of the secondary feathers. It also may be noticed that there were many holes drilled for the pins for the moving joints, etc.

When the model is completed, it must be tested and the wings synchronized. This model will run for hours, week after week, to test its correctness and to check on the wear of parts. All the bearings are hand made from brass.

The accessories for the bird exhibits and displays, such as the background, the leaves, the plants, the moss, the trees, the

Fig. 3. Sanding the bird bodies

Fig. 4. The maintenance department

grass, etc., also are assembled or made in this department.

Balsa wood is used in making the bodies of the birds. They are all hand carved, and the muscles and all the body contours are carefully followed and then the bird's skin is put on over this to re-create an exact replica of the actual bird.

Figure 3 shows the Delta 12-in. disk sander which is used for rough shaping the bird bodies prior to the final hand carving of the body. Then, too, all of the sanding needed on the forms for the labels and signs explaining the exhibits is done on this sander.

File of Bird Parts

Of unusual interest was the bird parts file consisting of a great number of lockers in which a rather complete selection of bird parts is kept. Mr. Dettmann mentioned that about 10,000 birds, bird parts, eggs, etc., are always on file here.

The specimens are kept in long drawers made up of sections and carefully catalogued. These drawers are kept in the lockers shown in Figure 4. There are about 88 lockers, all filled with these various items so necessary for proper construction and reference in connection with the various bird exhibits.

The bird eggs are received from many sources — some of them are obtained by the staff itself, others are brought in by individuals who either go out after them or run across them accidentally and bring them in to the museum. The eggs, once collected, are sorted and a little hole is drilled in one side of the egg. The egg is then held with the hole down and air is blown across this hole with a small tube. This sucks out the inside of the egg, leaving the shell and the small amount of residue which clings to the inside. The egg is then filled with an arsenic solution to sterilize and preserve it. After the solution has been removed and the interior has dried out, the egg is stored away for future use. The eggs themselves are kept in small boxes and are indexed as to kind and variety.

Many birds are also kept in this file, and here again many are brought in by the general public and are added to the collection already in the file. Both male and female of the various species in their fall and spring plumage are usually kept on file. The birds are first cleaned out and then they are filled with cotton and filed in the drawers.

Preparation Department

The preparation department consists of a number of sections, all of which have access to the various tools which are needed to make the many different parts going into the finished displays.

In one section, Mr. Moll was working on a miniature replica of the first commercial switchboard in the city of New York. This miniature, when finished, will be correct in every detail including the small figures of the people operating the switchboard. There are over 3000 separate pieces going into this display. Moll is shown in Figure 5 making the miniature moldings of the window frames on a spindle shaper.

The building, the furnishings, the accessories of the building, and the figures depicting the occupants of the building are all made to scale.

Mr. Moll has in his department a 14-in. metal cutting band saw, a spindle shaper, and a 6-in. jointer. All of these machines are available and are also used by the men in the other sections of the preparation department.

One of the more interesting parts of this particular replica are the chandeliers with their little lights which light up from the power system used to run the display. The chandeliers are made of a soft metal — brass, and Mr. Moll turned these, as well as some of the smaller accessories used for the exhibit, on a lathe which he has in this same department.

Figure 6 shows another part of the preparation department, where Mr. Joergensen makes the mechanical models which exhibit the operation of oil wells, power plants, mills, etc. He, too, has a number of power tools, among them old-time Delta Handi-Shop and a 12-in. scroll saw. In all cases, in either working up mechanical moving models or miniature replicas, the work must be accurate, and the artisans who make them must be very skillful, and have dependable tools.

Mr. Seebach makes the replicas of the human and animal figures for the many life-size and miniature displays. This work also requires much skill, and the men who operate the various departments must be combinations of artist, mechanic, inventor, zoologist, botanist, and what have you. In

Fig. 5. Constructing a miniature building in which the first commercial switchboard was housed in New York City. Fig. 6. Jig sawing out small parts for a miniature diorama

Mr. Seebach's case, it is necessary that the human figures be made to the correct racial stock, environment, conditions, era, etc. Careful research and study is necessary so that these are authentic. Model frames are first made of pipe and wire and wood and then over this is molded the clay to the correct body contour and muscular development. The heads are made separately and attached to the body later on.

One of the most interesting sections of the preparation department is that presided over by Mr. Majerowski. Here are made the trees, the leaves, the flowers, the fruits, the plants, etc., going into the many displays and exhibits throughout the museum.

Years ago, most of the leaf and plant parts were made of wax. This, however, was not too practical as the wax was subject to melting in heat and breaking and brittleness in cold. Now most of the leaves are made of plastic and are less fragile and look very real.

Two methods are used in making these leaves which show in finest detail the veins and markings as well as the colors. One is the chemical method in which a plastic sheet is immersed in an acetate solution and left to soften. When it is soft enough, it is put into water to remove all of the acetate and then placed between plastic molds and clamped tight with hand clamps, pressing the correct forms into the plastic.

The second method used is called the mechanical method. Here heat and a special plastic press is used. The plastic comes in small grains and is fed into the machine which heats the plastic to the correct temperature for molding. It is then pressed into sheets which are placed between molds and formed under pressures ranging from 4000 to 10,000 pounds, depending upon the item that is being produced. The molds used here are metal molds, as the plaster molds would break under this high pressure.

There are over 25,000 colors of plastic available and many combinations of colors are used to get the correct leaf and plant color. After the leaves are pressed out, they are hand painted to get the exact colors and variations found in plants, because even though color plastic is used, it would be much too uniform to be authentic as each leaf on a plant has just a little different shading.

In making up the final basic molds for reproduction, latex is being used quite extensively because it gives so much more detail than the material previously used. It has been found that the use of latex is advisable in making molds of small animals, fruits, and plants which have much fine detail of construction and overhang.

Mr. Dettmann in the vertebrate zoology department also uses latex in making the final molds of the human forms and the birds.

In the making of leaves and fruits, there is still some use made of wax, even though plastic is better in most cases. It has been found that on leaves such as those of the water lily and also on fruits, wax is much more lifelike and real in appearance. In making up fruits, the wax is not made in a solid form, but a shell is made of the fruit in order to conserve material and at the same time to make the fruit much lighter and easier to mount on the trees and bushes.

Taxidermy Department

The taxidermy department makes up all the major animals used in exhibits. First, a model is made over the animal's skeleton, then carefully using measurements taken in the field, the model is finished off with proper body contours and muscular construction. The final form is then made from the model and is a hollow shell made of plaster of Paris and bulrap and reinforced with iron pipes.

Department of Extension

The department of extension keeps on hand a file of many and varied displays in miniature — bird displays, historical displays, and also films which are lent out for a week or two at a time. These are available to schools, church organizations, clubs, etc., for training and study purposes. Most of these displays are created by the various departments we have just covered. These displays are maintained and kept in condition in these various departments. Some of the displays use settings in which little scroll saw cutouts depict the various figures in the display as in the traveling exhibit of a typical

(Continued on page 221)

Industrial Arts and Vocational Education
John J. Metz, *Editor*

POLIO POINTERS FOR 1951

It is to be hoped that the dreadful scourge of polio will spare our people this summer. No one but God knows whether it will or not, but it is well to be prepared for it when it does strike.

The National Foundation for Infantile Paralysis, Inc., 120 Broadway, New York 5, N. Y., expresses this thought most forcibly in these words:

"Unusually high incidence of polio in the past three years is a warning that we must prepare for probable outbreaks in 1951. In addition to 33,344 new cases in 1950, some 30,000 patients from other years still needed care last year." Meanwhile — though scientists are hopeful — as yet there is no way of preventing new epidemics of polio, so:

1. Allow children to play with friends they have been with right along. Keep them away from new people, especially in the close daily living of a home, because when polio has appeared in a community, scientists say the virus probably is widespread. Your children probably have come in contact with it already and developed a degree of resistance to that particular virus.

2. Wash hands carefully before eating and always after using the toilet — especially important when polio is around.

3. Watch for signs of sickness, such as headache, fever, sore throat, upset stomach, sore muscles, stiff neck or back, extreme tiredness or nervousness, trouble in breathing or swallowing.

4. Put a sick person to bed at once, away from others, and call the doctor. Quick action may lessen crippling.

While paralysis cannot be prevented, doctors have determined that early bedrest and prompt treatment may influence progress of the disease and lessen the severity of deformities.

5. Telephone your local Chapter of the National Foundation for Infantile Paralysis, if you need help. Locate through telephone book or health department.

6. Remember, at least half of all polio patients get well without any crippling. Recent surveys show that 50 per cent of all diagnosed polio cases suffer no paralysis at all. Another 25 per cent recover with no disabling aftereffects. Fifteen per cent are severely paralyzed and about 8 per cent die.

As preventatives:

1. Don't get overtired by hard play, exercise, work, or travel.

2. Don't get chilled. Don't bathe or swim long in cold water or sit around in wet clothes.

3. Don't have mouth or throat operations during a polio outbreak.

4. Don't use another person's towels, dishes, tableware, or the like.

5. Don't take children to places where there is polio because doing so would needlessly expose them to the polio virus.

6. Don't take your child out of camp or playground, where there is good health supervision. Routine daily living under proper supervision, such as good camps and playgrounds offer, is a safeguard to his health.

TO THE TEACHER

Have you decided which summer school you wish to attend during your vacation? Some instructors may not be so overjoyed with the idea of exchanging the position of teacher with that of student so shortly after the vacation period has started. It is necessary, however, to do so if one wants to progress professionally.

To help those who have not as yet made a choice of the institution which they wish to attend, a short list of universities offering summer school work in industrial arts and vocational education is presented herewith. The institutions are listed according to states so that they may be referred to more readily.

Writing to the director of summer sessions of the chosen institution will bring you the required information.

California: University of Southern California, Los Angeles 7, Calif.

Colorado: Colorado A. & M. College, Fort Collins, Colo.

Illinois: Bradley University, Bennett College, Peoria 5, Ill.

Michigan: Wayne University, Department of Industrial Teacher Education, 5451 Cass, Detroit 2, Mich.

Minnesota: University of Minnesota, Minneapolis 14, Minn.

New York: Cornell University, Ithaca, N. Y.; State Teachers College, Oswego, N. Y.

Oregon: Oregon State College, Corvallis, Ore.

Pennsylvania: The Pennsylvania State College, State College, Pa.; State Teachers College, California, Pa.

Texas: Texas A. & M. College, College Station, Tex.

Wisconsin: The Stout Institute, Menomonie, Wis.; Milwaukee School of Engineering, 1020 N. Broadway, Milwaukee 2, Wis.

THE 1951–52 REQUISITIONS ARE VERY IMPORTANT

Have you figured out what the requirements for your next year's classes will be? If not, it is time to get busy. Even if some of the material available for your work during the past few years is now restricted for military use, nevertheless, you must provide substitutes so that your shop subjects can go on as usual, because, go on they must.

This statement can be fairly well substantiated by the fact that during the school year 1951–52 the enrollment in day and evening industrial arts and vocational education school shops will exceed five million young and adult students of both sexes.

Is your present equipment able to carry your proportional part of this stupendous load? How are your machines and hand tools? Are you satisfied with their number and condition? Have you a sufficiently large amount of materials and supplies on hand? Do you feel that you and your shop are in such condition that you can stand the extra load that may be thrown upon you, if defense training will be thrust once more upon the schools?

The month of May and the earlier part of June still give you an opportunity to ponder upon these weighty problems. For that reason, the May issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION has been designated the "Requisition Number." The advertisements in this issue will be of great assistance to the shop teachers who are confronted with the problems of requisitioning the things needed for the school year 1951–52. Scan the advertisements closely and then write out your requisitions for the machines, tools, materials, and supplies that your next year's work requires.

Preserving Our Educational Goals in the Present World Crisis

THOMAS A. HIPPAKA
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(Concluded from page 176 of the April, 1951, issue)

The Work Experience Program

We shall prosper in proportion as we learn to dignify and glorify labor and put brains and skill into the common occupations of life. — *Booker T. Washington.*

Would that we could be more proud of our work experience programs. It is most unfortunate that even during peak employment, such programs are sadly neglected. More communities might be surveyed for work opportunities. There is very little evidence to the effect that parents, taxpayers, and employers are unwilling to co-operate.

The benefits accruing to the student from work experience are many. It improves the general school adjustment of the student, adding to his social adjustability as well as his emotional stability. Quite frequently, part-time work keeps a boy in school; it becomes a valuable motivator for more effective study. Often, such work gives him the economic self-sufficiency which he needs in order to remain in school. When the student graduates, it makes the transition period from school to full-time employment much more pleasant. Youth learns that human beings must work if they are to make their way in this world. To attend school as well as to hold a part-time job necessitates planning. Real responsibilities are thrust upon the student which demand judgment, industry, and persistence. Each task must be seen to its completion. One has to learn to work with others. To learn to supervise oneself always constitutes valuable experience, and to do so means that there is no escaping the important task of self-evaluation. One must set his own goals.

There are certain essentials to every work-experience program. A qualified staff member with sufficient time to plan, promote, co-ordinate, and administer the program needs to be assigned to it. Such a co-ordinator articulates the nature of the student's job with his schoolwork. He knows the learning opportunities of the job for the student. From the standpoint of credit, work-experience has an equal status with school subjects. The student is carefully supervised on the job in order that he will attain the best possible standards of performance. Thus, the home, school, and industry co-operate in order that the student may grow into a happy, productive, intelligent, and law-abiding citizen.

Through a well-articulated program of work and study the student learns that:

1. Labor, industry, the consumer, and the government are all partners in the production of goods.

2. Our government's responsibility is to establish the rules of the game by passing needed legislation, and to furnish competent officials "to umpire the game" when labor and industry find themselves deadlocked.

3. No individual or group of individuals has a right to paralyze the country.

4. Wealth is created through work which results in the production of goods.

5. Increased wages stem from greater production.

6. A premium should always be placed upon individual initiative, industry, courage, resourcefulness, and the risking of capital.

7. Human relationships conducive to industrial peace and maximum production should always be our goal.

8. The employer has a moral responsibility not to let the worker down, and the worker is obligated not to produce chaos by the indiscriminate withdrawal of labor power.

9. Only the productive can be strong, and only the strong can be free.

The World Needs Us at Our Best

We will walk on our feet
We will work with our hands
We will think with our minds.
— *John Ruskin.*

We must bring to our every endeavor the will to do; a determination to earn our own way. Ours is a dangerous world where democracy is fighting for its very survival. However, it is also a challenging world full of opportunity for service. Men must face complexities of a continuously changing world with realism and courage regardless of the odds against them. Industry, persistence, and integrity must characterize our behavior if we are to be equal to the task. Ours must be a personal interest in human welfare which seizes every opportunity to help others improve their living. Our unbelievably miraculous technology needs to be paralleled more closely with practical human engineering which is so essential to our peaceful industrial relations in America, as well as our survival in a confused world.

In the words of Mr. Francis of the General Foods Corporation, we need to begin here in our own democracy:

> To attain positive industrial peace, we need something more than by-laws and compulsory rules. We need men working willingly together toward known goals. We need, in short, workers who are informed, workers who enjoy a sense of security; workers who are given a feeling of individual dignity; workers who are properly and fairly paid, workers who are given non-financial incentives.

Youth should be taught certain concepts which are becoming more and more important in the world of work:

1. While there are no substitutes for skills, the majority of workers who lose their jobs do so because they cannot get along with people.

2. Since ours is a free, competitive society, we must be good competitors.

3. It is important for us to learn to plan our work as well as to supervise ourselves.

4. We must be able to meet discouragement, sensibly.

5. The assumption that a diploma constitutes an insurance policy, whereby we escape failure or unemployment, is false. Even with such preparation, we must be willing to start on a lower rung of the ladder and make our own progress. On this point, Leroy A. Wilson admonishes us that, "It's the challenge of the job, not the level."

6. There are no substitutes for orderly work habits.

7. Tact, judgment, courtesy, initiative, dependability, and honesty serve us in good stead.

8. Physical vigor and mental health are imperative.

9. Emotional stability is an essential.

10. Each task is a challenge, and growth comes through trials and difficult tasks.

11. Industry has a right to expect that we come to work regularly in an agreeable frame of mind.

12. To please our fellow workers, foremen, supervisors, and the management by exercising skill, care, and reasonable effort in our work, constitutes a worthy goal.

13. It is necessary, and we owe it to ourselves, to perform our duties with self-satisfaction. In the words of Ralph Waldo Emerson, "The reward of a thing well done is to have done it."

14. Criticism needs to be taken sanely.

15. We need to learn to do more than the minimum essentials on the job. What can I do, and not what do I have to do? That is the chief consideration.

16. Clean, wholesome living is essential to success in any vocation.

17. Employers place a high premium on character.

18. A well-integrated personality is always a decided asset to anyone.

In a democracy such as ours, the worker has a right to expect certain returns other than the monetary ones, from his vocation. Wise is the man who has other aspirations besides his salary check. Briefly, they can very well be these:

1. Security through honest effort.
2. Possibilities for advancement on the job.
3. To be treated with respect.
4. Recognition for work well done.
5. Opportunity to render a service.
6. Tenure.
7. Savings.
8. Insurance.
9. Steadiness of work.
10. Good working conditions.
11. To be able to live a life as well as to earn a living.
12. Job satisfaction.
13. The job which affords a constant challenge to one's resourcefulness.
14. To be proud of one's job, company, or employer.

Giving ourselves at our best as workers and citizens can very well be the cure for many of the ills of this world. Progress toward maximum production, industrial peace, and even world peace, depends upon the improvement made in our human material. As we enjoy the blessings of free men in our own land, we need to extend democracy to the remainder of the world. Bernard M. Baruch would remind us that:

> The world has no place to turn today for regeneration except to the United States. But if we are to accept the challenge to save civilization, it means greater effort.... There are no adequate substitutes for hard work and full production. If we are to win the peace, as we helped to win the war, we must do it by showing the real might of America — by justice, by helpfulness which insists upon self-help, and finally, by production, and still more production. Only in this way can we reduce the cost of living and build up our reserves — physical, financial, and spiritual.

The Organization of Instructional Material for Apprentice Training

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When one considers the type of teacher training to be given to a teacher of apprentices, one must keep in mind that the teachers in this field are likely to be tradesmen or craftsmen. Because of their background, it is likely that they are quite unfamiliar with the skills or techniques commonly used in the teaching profession.

If these tradesmen are to be trained as teachers, the type of training given will depend upon certain conditions. If the instructional outline or program has been set up, the training program for the teacher resolves itself into preparing him to transmit to the learner the material included in the outline to be followed by the apprentice. This means teaching him the techniques and helping him develop the skills commonly used by a good teacher.

On the other hand, if an instructional program for the apprentice has not been developed, one of the first functions of the teacher trainer is to assist the tradesman-teacher to develop one. The process of developing this program involves a num-

ber of steps that must be followed if the outline prepared is to conform to good educational procedure. Since each of these steps leads up in a logical manner to the succeeding step, it is important that they be taken in their proper order. In order to insure that all the steps have been taken, and to make certain that they have been followed in proper rotation, the teacher trainer must have a method of recording each step as it is taken. In other words, the teacher trainer must have an efficient system of *bookkeeping*, covering all activities in the development of an adequate vocational program.

Without some such system it is difficult for the incoming apprentice teacher to get an over-all picture of the program in which he is participating, and his position in the program. Without some such system the teacher trainer may unconsciously overlook some of the basic rules of good teaching — for, after all, is he not playing the same role in his transactions with the apprentice instructor, as the apprentice instructor will be required to repeat with his apprentices? Thus, as the teacher trainer is in a strategic position to set an example of good teaching and good organization, it is doubly important that he maintain clear records which will not only guide him in the performance of his task — but also show those interested in the program what has been accomplished, and how the task is being approached.

The development of such a system of records may be truly termed *bookkeeping* if the system provides administration and the teacher with a record of the instructional status of a program. In order to do this the system must be such that it will present a clear picture of the over-all program and at the same time lend itself to a breakdown into smaller units which will make it possible to scrutinize in detail the items which make up the whole. Furthermore, the system must be such that it indicates to the instructor what has been accomplished and what is to be completed. It should stimulate constructive thinking and serve as a stimulus for further work. In addition it should assist the teacher trainer in making intelligent teacher training assignments. But how may one proceed to construct such a system of bookkeeping?

STEP I — Dividing the Program Into Training Periods

It seems advisable, when attempting to organize an instructional program, to first break down the total time to be devoted to the program into smaller units of time. These smaller units of time should be such that they will encompass an amount of instructional material which is readily analyzed. This appears to be a natural procedure since it is always easier to read an assembly drawing if the detail drawings are available. In fact, detail drawings sometimes become a necessity because the many details on the assembly drawing tend to cover one another and thereby make the identity of any one detail difficult if not impossible. The same is true for an instructional program — if an understandable breakdown of the complete program is not effected the content of the entire program is obscure and identity of its parts is difficult.

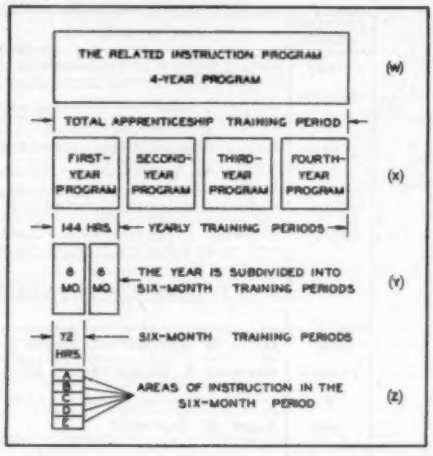

Fig. 1. Breakdown of the training program into training periods and instructional areas

It is generally considered that a six months' training period constitutes a satisfactory breakdown of an apprentice program. Such a breakdown is suggested in Figure 1. In this case the total apprenticeship period — which may be from two to seven years in duration (a four-year program is shown) — is divided into: (1) yearly blocks; (2) six months' training periods; and (3) further divided into five instructional areas A, B, C, D, and E.

When the division of the total time into suitable training periods has been accomplished, we are ready to determine what is to be taught during each training period. This involves an analysis of the related-subject content and the development of some method of segregating, titling, and recording this content. A system which lends itself to the performance of this task is described in *Step II*.

STEP II — Segregating and Cataloguing Under Suitable Subject Titles

When attempting to select what is to be taught for a related subject program the natural result will be the development of a list of items which the apprentice teacher or the tradesman feels should be taught. Usually, this list will be composed of heterogeneous items that must be segregated into homogeneous parcels of instruction wherein items which are related will be placed. This results in what may be termed *subject content* and the usual practice which follows is to assign a name to this material which is indicative of its content. This method of selecting the name for the subject results in many and varied subject titles which from the standpoint of cataloguing and recording is both complicated and confusing. In order to eliminate the complications with which the teacher trainer will be confronted if no standard method for assigning title to subjects is used — all subjects are given a title which will place them into one of the instructional areas as shown in Figure 2.

In this particular case these instructional areas were assigned the titles of, Mathematics, Drawing, Science, Shop, and Social Studies.* Using this system, all subjects

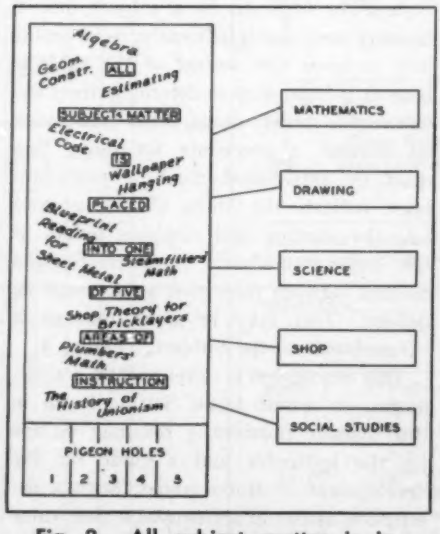

Fig. 2. All subject matter is inspected and placed into one of five major divisions or areas of instruction

*Recommended at a Conference of Vocational Administrators and Teacher Trainers, University of Michigan Extension, Detroit, September 27, 1946.

which involved mathematics (estimating, etc.) were given the title, *mathematics;* all subjects whose content had to do with drawing, drafting, sketching, or blueprint reading, were titled, *drawing*, etc. Such a procedure will channel a confusing mass of instructional items and subject titles into categories which are much more readily catalogued and therefore much easier to analyze and develop into a related subject program.

After areas of instruction have been agreed upon so that a common interpretation of instructional items is obtained, some system is required to *locate* the subjects or show their position in the instructional program. To accomplish this the form described in *Step III* was developed.

STEP III — Locating Each Subject in the Training Program

Subjects in a training program may be likened to the details which make up a machine. Improperly placed details, improperly fitted details, or the lack of certain details will affect greatly the operation of the machine. The same holds true of an instructional program. If the subject content is not correct, if the content is not properly arranged, or if the subject is not in its proper position in the training program — the effect may greatly reduce the efficiency of the program. In order to have some control over such discrepancies a method of indicating where a subject is located in the program, the time allotted to the subject, as well as where data relative to the content of the subject may be located in the training program must be available. The form, Figure 3, shows a method whereby information of this type may be recorded and easily located when needed. The completed form shows:

a) The training period
b) The duration of the training period in months
c) The name of the subject
d) The time devoted to each subject
e) The subject number (M-1, M-2, etc.)
f) The study guide number (M-1, M-2, etc.)
g) The page in the training program outline upon which a description of the subject may be found (indicated in column marked **)

TRAINING PERIOD	NAME OF SUBJECT	TOTAL HRS.	MAN.* NO.	** PAGE	REMARKS
FIRST	MATH. I (REVIEW OF FUNDAMENTALS)	12	PL-1	3	
PERIOD			2		
6	SCIENCE I (SHOP THEORY & SAFETY)	12	PL-3	4	
MO.	SHOP I (FUNDAMENTAL PROCESSES)	48	PL-4	5	
			5		
SECOND	MATH. II (VOLUMES & AREAS)	12	PL-6	3	
PERIOD	DRAWING I (GEOMETRICAL CONSTRUCTIONS)	12	PL-7	6	
6			8		
MO.	SHOP II (ELEMENTARY PLASTERING)	48	PL-9	5	
			10		
THIRD	MATH. III (ESTIMATING LABOR & MATERIALS)	12	PL-11	3	
PERIOD	DRAWING II (GEOMETRICAL CONSTRUCTIONS)	12	PL-12	6	
6			13		
MO.	SHOP III (ARCHES)	48	PL-14	5	
			15		
FOURTH	MATH IV (ESTIMATING)	6	PL-16	3	
PERIOD	DRAWING III (HOUSE PLANS)	12	PL-17	6	
6	SCIENCE II (SHOP THEORY)	6	PL-18	4	
MO	SHOP IV (MOLD MAKING - CORNICES - PANELS)	48	PL-19	5	
			20		

Fig. 3. Method of indicating the position of subjects in a training program, the time allotted to the subject, the subject number, the study guide number, and the page upon which the description of the subject is located

*Instructor's manual or apprentice study guide
**Pages upon which the description of the subject is located

h) The number of training periods in the complete program

STEP IV — Content Specified Through a Description of the Subject

The possession of a blueprint as described in Step III is not all that is required to complete this record-keeping system. In order to fit a subject into a training program intelligently it is necessary to know the *content* of the subject. Since it is impossible to determine from the name of a subject alone, what constitutes its content, a procedure for doing this must be established. Such a procedure must indicate the limits of the subject; i.e., the starting and stopping points in the subject analysis. Furthermore, the content between these two points must be defined. This may be done through a "Description of the Subject," Figure 4.

This description is developed on a topic, lesson, or session basis. Setting it up in this manner provides a teaching outline for the instructor and a guide for the development of study guides. Such a description assists in arriving at a time value for the subject and also results in an analysis of what is to be taught. This description of the subject carries the many details which help develop the program in its entirety. It is through a careful description of each subject that desirable subject content results; it is through each well-organized subject that a well-organized program is obtained, for the quality of the program is dependent to a large degree upon the subjects which make it up. In the final analysis, the description provides the specifications which indicate to administration, the joint apprenticeship committee, and others, what is being taught.

STEP V — Chart Indicating Percentage of Time Allotted Each Major Division Is Desirable

In order to analyze a program on the basis of the distribution of time allotted to each instructional area or subject, a chart such as shown in Figure 5 can be developed. This chart indicates the time in hours devoted to each subject and the percentage of the total time devoted to a given subject.

The uses of this chart are many. After a program has been completed it is always interesting to learn how the time has been distributed among the various subjects. Thus a comparison of the developed pro-

Subject-Time and Manual Number	Description of Subject
MATH. I 12 hrs. Manual PI-1	— Mathematics I is to consist of tests to determine the student's ability to perform the fundamental processes in mathematics. These tests are to be supplemented by instruction and remedial work where necessary. Specifically the student will be tested and instructed on the following processes: a. the addition, subtraction, multiplication, and division of whole numbers. b. the addition, subtraction, multiplication, and division of fractions and mixed numbers. c. the addition, subtraction, multiplication, and division of decimals. d. the conversion of fractions to decimals, decimals to fractions, inches into feet or feet into inches, etc.
SCIENCE I (Shop Theory) 12 hrs. Manual PI-3	— Science I is to consist of lectures and demonstrations in the following: a. the use of the tools of the trade. b. how mortar is mixed and proportioned. c. safety precautions the plasterer must know. d. history of the trade. e. mixing brown mortar. f. explanation and discussion of the jobs the apprentice is to perform in the shop.
SHOP I 48 hrs. Manual PI-4	— Shop I is designed to teach the apprentice the operations and work assignments which he is likely to be called upon to perform during the first months of his apprenticeship. The instruction will consist of the following jobs: a. pick up mortar from the mortar board using the hawk and trowel. b. pick up mortar from the hawk using the trowel. c. pick up and apply mortar on a masonry wall. d. establish a wall and ceiling line by means of dots. Apply screeds to dots. e. fill wall to screeds with brown mortar to a true surface using rod and darby. f. apply scratch coat on metal lath. g. apply brown coat over scratch coat. h. mix putty coat finish on finishing board. i. apply putty coat to ceiling and wall and trowel to a finish.

Fig. 4. Examples of descriptions of subjects (Plasterer Program)

Subject	Training Period & Time in Hours 1	2	3	4	5	6	7	8	9	10	11	12	Total Hours	Percentage of Time
Math.	12	12	12	6	12			8					62	10.7%
Draw.		12	12	12	24	12	18	8					98	17.0%
Science	12			6	12	12	6						48	8.3%
Shop	48	48	48	48	24	48	48	48					360	62.5%
Soc. Science								8					8	1.4%
Total	72	72	72	72	72	72	72	72					576	99.9%

Fig. 5. Distribution of time among the subjects in the program

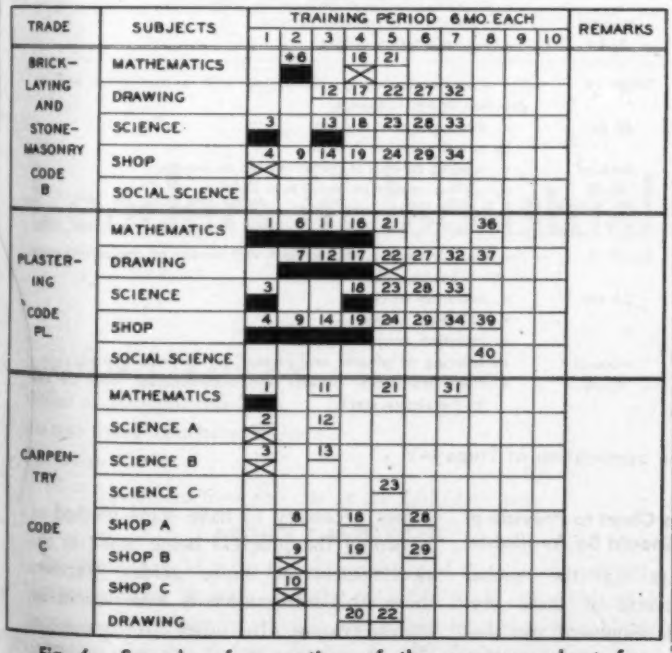

Fig. 6. Sample of a section of the progress chart for recording the development of study guides in each program

RELATED INSTRUCTION PROGRAM FOR PLASTERER APPRENTICES

INSTRUCTORS: Mr. Knowles and Mr. Van Den Branden

Training Period	Name of Subject	Total Hrs.	Man.* No.	** Page	Remarks
First Period 6 Mo.	Math. I (Review of Fundamentals)	12	PI-1 2	3	
	Science I (Shop Theory & Safety)	12	PI-3	4	
	Shop I (Fundamental Processes)	48	PI-4 5	5	
Second Period 6 Mo.	Math. II (Volumes & Areas)	12	PI-6	3	
	Draw. I (Geom. Constr.)	12	PI-7 8	6	
	Shop II (Elementary Plastering)	48	PI-9 10	5	
Third Period 6 Mo.	Math. III (Estimating Labor & Mat'ls)	12	PI-11	3	
	Draw. II (Geometrical Constr.)	12	PI-12 13	6	
	Shop III (Arches)	48	PI-14 15	5	
Fourth Period 6 Mo.	Math. IV (Estimating)	6	PI-16	3	
	Draw. III (House Plans)	12	PI-17	6	
	Science II (Shop Theory)	6	PI-18	4	
	Shop IV (Mold Making — Cornices — Panels)	48	PI-19 20	5	

*Instructor's Manual or Apprentice Study Guide.
**Pages upon which the description of the subject is located.

Subject-Time and Manual Number	Description of Subject
MATH. I 12 hrs.	— Mathematics I is to consist of tests to determine the student's ability to perform the fundamental processes in mathematics. These tests are to be supplemented by instruction and remedial work where necessary. Specifically the student will be tested and instructed on the following processes: a. the addition, subtraction, multiplication, and division of whole numbers. b. the addition, subtraction, multiplication, and division of fractions, and mixed numbers.

Fig. 7. Continued next page

Manual	c. the addition, subtraction, multiplication, and division of decimals.
PI-1	d. the conversion of fractions to decimals, decimals to fractions, inches into feet or feet into inches, etc.
MATH. II	— Mathematics II is to consist of instruction and problems involving:
12 hrs.	a. how to compute volumes.
	b. how to compute areas.
Manual	c. geometry as applied to plastering trade.
PI-6	d. how to estimate material requirements for a room or job.
MATH. III	— Mathematics III is to consist of problems in:
12 hrs.	a. estimating labor and material for a given job.
Manual	b. elementary geometry involving the type of problems
PI-11	which are common in the trade.
MATH. IV	— This subject is a continuation of the work in Mathematics III
6 hrs.	and will involve further instruction and problems in practical
Manual	geometry.
PI-16	
MATH. V	— The study and work in this subject will consist of problems in geometry involving the computing of dimensions for elliptical arches and groined ceilings as follows:
	a. to compute the foci of a three point elliptical arch.
12 hrs.	b. to compute the foci of a five point elliptical arch.
	c. to compute the foci of an elliptical arch developed by a graduated straight edge.
	d. to compute foci for an elliptical arch developed by a string.
Manual	e. to compute foci for an elliptical arch developed by a trammel.
PI-21	f. to compute radius points for groined ceiling side arches.
	g. to compute diagonal lines for groined ceiling using ordinates.
MATH. VI	— Mathematics VI will consist of estimating material and labor
8 hrs.	for a given job using standard forms. (TEST)
Manual	
PI-36	

RELATED INSTRUCTION PROGRAM FOR PLASTERER APPRENTICES

Training Period	Name of Subject	Total Hrs.	Man. No.	Page	Remarks
Fifth	Math. V	12	PI-21	3	
Period	Draw. IV	24	PI-22	7	
6	Science III	12	PI-23	4	
Mo.	Shop V	24	PI-24	5	
			25		
Sixth			26		
Period	Draw. V	12	PI-27	7	
6	Science IV	12	PI-28	4	
Mo.	Shop VI	48	PI-29	6	
			30		
Seventh			31		
Period	Draw. VI	18	PI-32	7	
6	Science V	6	PI-33	4	
Mo.	Shop VII	48	PI-34	6	
			35		
Eighth	Math. VI	8	PI-36	3	
Period	Draw. VII	8	PI-37	7	
6			38		
Mo.	Shop VIII	48	PI-39	6	
	Social Science I	8	PI-40	7	
Ninth			41		
Period			42		
			43		
			44		
			45		

Subject-Time and Manual Number	Description of Subject
SHOP I	— Shop I is designed to teach the apprentice the operations and work assignments which he is likely to be called upon to perform during the first months of his apprenticeship. The instruction will consist of the following jobs:
48 hrs.	a. pick up mortar from the mortar board using the hawk and trowel.
	b. pick up mortar from the hawk using the trowel.
	c. pick up and apply mortar on a masonry wall.
	d. establish a wall and ceiling line by means of dots. Apply screeds to dots.
	e. fill wall to screeds with brown mortar to a true surface using rod and darby.
	f. apply scratch coat on metal lath.
Manual	g. apply brown coat over scratch coat.
	h. mix putty coat finish on finishing board.
PI-4	i. apply putty coat to ceiling and wall and trowel to a finish.
SHOP II	— The shop work in this period will involve instruction and the practical application of the following:
	a. browning on different types of surfaces.
48 hrs.	b. mix and apply different types of finishes.
	c. make molds from blueprints.
	d. laying out dots and screeds for cornice work.
Manual	e. run cornice with molds and miter.
PI-9	f. construction of molds for bench work.
	g. construction of a wood square to check work.
SHOP III	— The work in this subject will involve:
	a. laying out dots and screeds for arches.
48 hrs.	b. construct templates for arches and groin ceiling.
	c. develop pressed screeds using a template.
Manual	d. mitering a compound cornice.
PI-14	e. layout a groin ceiling.
SHOP IV	— The shop work during this period will involve work and instruction in the following:
48 hrs.	a. advance mold making.
	b. mitering inside breaks.
Manual	c. running cornice or panel section on bench.
PI-19	d. cutting cornice or panel to a detail.
	e. setting cornice and panel on wall and ceiling.
SHOP V	— The shop practice in this subject will consist of the construction of the following jobs:
24 hrs.	a. imitation brick.
	b. imitation stone.
	c. imitation wood.
Manual	d. coloring of plaster and cement for the above work.
PI-24	e. make templates, cutters, and other special tools for use in the above work.

Fig. 7. An example of the application of Steps I–V

gram with the program as set up in the Standards by the Joint Apprenticeship Committee, or other similar programs, is possible. If discrepancies occur the chart provides a basis for intelligent discussion and recording of changes which seem desirable.

STEP VI — A Progress Chart to Provide a Cumulative Record Should Be Available

When one considers that the teacher trainer may have several of these programs in process of development and that he may be working with from one to five or more teachers on one program, it becomes necessary to have some method of recording the progress being made in the development of study guides. Furthermore, this information is also desired by administration. In order to accomplish this the chart, Figure 6, is used. This chart indicates the name of the trade, the

code number used to distinguish the manuals, the subjects offered in the trade, the subject number, the study guide number (see Fig. 3), the training period in which the subject is taught, and whether the manual for the subject has been completed or is in process. The *X* in the space signifies that the manual is in process, while the solid block below the number indicates the study guide manual is completed.

Study guides are in the last analysis perhaps one of the most effective mediums by which individual instruction can be administered in an apprenticeship program. To encourage the construction of study guides by the apprentice instructors the teacher trainer must be in a position to make intelligent assignments and effectively check and offer constructive suggestions on the material when it is submitted. In order to do this when working with many teachers on an itinerant basis, not only must his suggestions be based on the over-all program but also upon a knowledge of what has been completed in each program and what is to follow. The record chart discussed here enables such a procedure.

The Assembly of Steps I–V

An example of the application of the procedure outlined in this article is shown in Figure 7. The figure shows four pages of a related instruction outline assembled following Steps I–V. The outline from which this example was taken was developed for the Plasterer Apprentices, Apprentice Training School, Detroit, by Mark Knowles, head apprentice teacher, and Felician Van Den Branden, instructor. In the example, pages 1, 2, 3, and 5, respectively, of the original outline are shown.

Inspecting this related instruction outline we find that Mathematics I, Science I, and Shop I are the subjects to be taught during the first training period. Investigating further we find, that 12 hours are to be devoted to Mathematics I, 12 hours are to be devoted to Science I, and 48 hours to Shop I. These subjects have been given code numbers P1-1, P1-3, and P1-4. As the name of the subject and the time allotted to it are not indicative of what is to be taught, a description of Mathematics I is given on page 3. Similarly, descriptions of Science I and Shop I are found on pages 4 and 5 respectively as indicated in the column marked "page." As already explained, only subjects indicated as being described on pages 3 and 5 are shown. The study guides which have been completed for this program are indicated in Figure 6.

Conclusions

It is not necessary at this point to go into a lengthy discussion of the merits of such a bookkeeping procedure for instructional material. However, some of the significant things which the author has felt have developed through the use of this plan may serve to summarize the needs and benefits of such procedures. During the three years in which this system has been followed in Detroit the instructional outlines for 14 trades have been completed and the instructors are actively engaged in organizing study guide manuals. Other significant points are:

1. Gives the apprentice a picture of what he is expected to learn.
2. Indicates to administration and the joint apprenticeship committee what is being taught.
3. Provides a systematic approach to the organization of instructional material.
4. Gives the instructor an opportunity to analyze his duties and his position in the program.
5. Provides an over-all blueprint from which changes and improvements may be made on the basis of what exists.
6. Enables the detection of similar subjects in different trades — thus study guide manuals from one trade may be used in other trades.*
7. Provokes thought relative to what is being taught on a program.
8. Serves as a stimulus to instructors.
9. Provides a basis for intelligent teacher training assignments.
10. Serves as a basis for the evaluation of a program by those qualified to measure it.

*With approval of Joint Apprenticeship Committees and School Administration.

Leaders in Industrial Education

WILLIAM T. BAWDEN
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(Continued from page 150 of the April, 1951, issue)

ARTHUR DAVIS DEAN

It is more than 25 years since the subject of this sketch resigned his last teaching position, to take up other work only distantly related to industrial education, in which field for a time he ranked as one of the outstanding leaders in the United States. The lapse of 25 years has brought about an almost complete turnover among those who were prominent during the first quarter of this century, and of the men and women who shared with Dr. Dean the leadership of that period very few remain in active service. It was instructive to note the announcement of his death, which appeared in one of our professional journals a few months ago, and which consisted of only a few vague generalities, with no dates or other particulars, as if the reporter were writing about some nebulous character but dimly recalled out of the misty past.

These circumstances of fading out of consciousness and of apparent neglect are by no means unusual. They are the common lot of all but the most inspired and fortunate of leaders. In

the rush and turmoil of modern life, it is easy for us to lose sight of our indebtedness to those who have gone before us. Figuratively speaking, the pioneers laid out the highways, filled in the mudholes, leveled the precipitous steeps, and established warning and direction signs; but we bowl along at high speeds, without giving much thought to what they did to make our progress easier, pleasanter, and speedier. Reflections such as these suggest the significance of setting down in the record something of the personalities of the early leaders before they slip away entirely from the recollection of the living.

Early Life

Arthur Davis Dean was born at Cambridge, Mass., September 15, 1872, and died at Danbury, Conn., November 19, 1949.

He attended one of the public elementary schools of Cambridge, and was the first boy to enroll in the historic Rindge Manual Training High School when it opened in 1888. This was one of the earliest of such schools to be opened in the United States, following the establishment of the St. Louis Manual Training School by Dr. Calvin M. Woodward, which opened its doors on September 6, 1880. The funds for erecting the building for the new school in Cambridge were donated to the city by a public-spirited citizen, Frederick H. Rindge. Although the school bore his name, it was maintained as a part of the city school system.

Graduating from the Rindge Manual Training School in 1891, Dean entered the Massachusetts Institute of Technology, from which he was graduated in 1895 with the degree B.S. in the Department of Electrical Engineering. In 1913, he was awarded the honorary degree, Sc.D., by Alfred University, Alfred, N. Y., in recognition of his achievements in the field of public education, more particularly industrial education.

His teaching experience began in Portland, Me., where he was a teacher of manual training in the elementary school for two years, 1895–97. He then went to Malden, Mass., where he introduced and equipped a department of manual training in the senior high school, 1897–99.

A Notable Career

In the fall of 1899, he went to Springfield, Mass., where he assisted in the organization of the new Technical High School, and served as assistant principal and head of the mechanic-arts department for seven years, 1899–1906. It was during this period that his leadership qualities attracted attention, and his professional career really began. Under Dean's supervision evening trade classes were opened for workers in patternmaking, plumbing, toolmaking, and machine-shop practice. These classes were said to be the first offering of trade classes in a public school.

Under the title, "An Experiment in Teaching Trades at Public Expense," Dean contributed the first article on vocational education to be published in the old *Manual Training Magazine*, Vol. 2, No. 3, April, 1901. This "experiment" was accompanied by a thorough study of the men who enrolled in the classes, their educational background, details of the requirements of the jobs from which they came, and the shops and factories in which they were employed, including opportunities for training in the shops and factories. Every effort was made to insure for each student direct application of the instruction in the evening classes to the daily activities on the job.

While in Springfield, Dean was invited by the Insular Government of Puerto Rico to make an investigation of industrial and agricultural conditions, with the view to formulating recommendations for the establishment of industrial and agricultural schools. Upon the conclusion of this study, made in 1902, he submitted a report to the Commissioner of Education.

In 1906, he was appointed supervisor of education for industrial workers in Massachusetts and Rhode Island under a co-operative arrangement set up by the YMCA organizations of the two states. While engaged in this work he took advantage of the opportunity to study industrial plants and working conditions in many cities. He endeavored to be of service "by promoting the idea of definite industrial education, and by establishing schools and classes for textile workers, workers in shoe factories, machine trades, building trades, and others. Approximately 5000 workers in 28 different cities and towns in the two states were enrolled in these classes." He continued in this work for two years, 1906–08.

Arthur D. Dean

New York State Department of Education

During this period and a little earlier he was for five summers in charge of courses for the preparation of teachers of industrial work enrolled in the summer sessions at Cornell University, Ithaca, N. Y. It was here that he became acquainted with conditions in New York State, which later led to his appointment as chief of the division of vocational schools in the State Department of Education, Albany, N. Y. He held this position for nine years, 1908–17.

It was characteristic of him that he sought every possible opportunity and spent much time in consultation with manufacturers and other employers, schoolmen, leaders of organized labor, and others, with reference to the development of an effective system of vocational schools for New York State. He made it a point to visit every important vocational school in the search for new ideas, in the effort to appraise and evaluate the means and methods devised for the attainment of the aims

of vocational education, and especially to extend his acquaintance among the men and women who were accomplishing worth-while results, and to see how they were doing it. He was probably one of the best informed men of his day with reference to what was going on in vocational education, and a keen judge of men.

It was during this period that his writing began to attract attention. When the late Charles A. Bennett began the publication of the *Manual Training Magazine,* in October, 1899, he invited three nationally known leaders to join the staff as associate editors, to assist by counsel and advice, and by editorial and other contributions. In 1911, when a vacancy occurred, Dean accepted appointment as associate editor, and continued in this capacity until 1919.

I remember very well Dean's first editorial, which was published in two parts, beginning in October, 1911: "1. A Richer Content for Courses in Manual Arts"; and "2. A Richer Content in the Mind of the Teacher." In his characteristically vigorous and pungent style he admonished his readers that teachers of shopwork and drawing should be concerned with questions and problems more significant than, "Shall I teach the use of the rip-saw before the crosscut-saw?"

In 1901, Gustav Stickley (1858–1942), who began as a manufacturer of furniture in Syracuse, N. Y., transferred his business to New York City, and founded *The Craftsman,* a monthly magazine "as an exponent and advocate of simpler and more democratic expression in all arts and crafts, especially in those related to home building, home furnishing, and decoration." He also achieved some prominence as a designer and manufacturer of "Craftsman" furniture, hand-wrought metalwork, and other forms of handicraft. Many of his designs were borrowed by industrial-arts teachers of woodwork and metalwork of that period, 1900–20, and produced by pupils in high school shops.

Mr. Stickley, through the columns of *The Craftsman,* conducted a nationwide essay competition on the subject, "The Relation of Manual Training in the Public Schools to Industrial Education and Efficiency." Dean submitted a paper in this competition and won first place.

A little later, *The World's Work,* published in New York City, conducted an essay competition on the subject, "The School of the Future." Dean submitted a paper in this competition also, and again won first prize. These two prize essays, added to his contributions to the *Manual Training Magazine,* attracted nationwide attention because of his evident understanding of the problems of public education, his forceful and authoritative style, and his understanding of human nature.

A Prolific Writer

In addition to the writings mentioned, he contributed numerous articles to *Machinery, American Industries,* and other technical as well as professional journals.

He was also author of three books that contributed materially to his commanding position as a national leader: *The Worker and The State,* published in 1910; *Our Schools in War Time and After,* published in 1917; and *Just Between Ourselves,* published in 1923. In order to set down something of the nature, and especially the quality, of his contribution through the printed page, I must give some attention to two of these publications.

The Worker and the State

It is impossible in a brief statement to give an adequate impression of the book.[1] Its significance lies in the fact that it came so early in the movement for vocational education, when so many were eagerly looking for help; that it served to focus attention upon practical applications of the contributions of the theorists and the philosophers; and that it set forth so clearly and so authoritatively the fundamental interest of society in taking the necessary measures for the preparation of youth for adult living, and the responsibility of society in these matters as contrasted with the desires and ambitions of the individual.

The author reviews the development of plans for the training of young workers, beginning with the period when every community, if not every home, was an independent, self-contained economic unit, with practically all productive and constructive processes centered in the home, and tracing the gradual transfer of these activities, one after the other, from the home to the shop, or factory, or mill.

In this transformation, society eliminated or discarded the provisions and the experiences which formerly insured the acquisition on the part of every normal young man and young woman of reasonably adequate preparation for playing some worth-while role in adult life. Examining the conditions as of the period when the book was written, it was evident that "no present path leads to craftsmanship." The old method of handing skills and knowledge on from father to son and from mother to daughter had been discarded, and no plan or method had been adopted to take its place. "In its industrial phase our present generation differs vastly from the last. We see that boys and girls have been led away from the crafts and the home, and that they no longer desire to learn a trade of the shop or household; and that individual skill and experience are largely disconnected in the monotonous toil of department store and factory. One of the noblest of callings, that of tilling the soil, has so far deteriorated in common estimation that a particularly awkward boy is derided by the term 'farmer.' We find our workers in the factory, in the counting-room, and in the store, regarding their work in terms of hours and wages with little thought of craftsmanship, for which hours and wages are but the material symbols."

Developing the concept of the educational significance of modern industry, he urged the utilization of the innumerable opportunities for insuring an adequate supply of skilled workers of every sort, and pointed out the reciprocal benefits to industry and business if carried on with the advantages of highly trained personnel.

[1]Arthur D. Dean: *The Worker and The State* (New York: The Century Co., 1910), cloth, 375 pp.

(*To be continued*)

Clay modeling. Tucson Senior High School, Tucson, Ariz. Submitted by Harry A. Goldstein

— Photograph by Billie Harris and Mary Pfrimmer

PROBLEMS AND PROJECTS

TABLE TENNIS BALL HOLDER

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One of the problems involved with table tennis is that of ball storage. Placed on a shelf balls invariably roll off or get lost in back of other supplies. Frequently too, they fall to the floor and are stepped on and ruined. It is easier to know how many usable balls there are on hand if they are kept in a holder.

The holder shown was designed to hold seven balls. The length of the project may be altered to take care of a smaller or larger number of balls.

This project is recommended as a basic project in sheet metal since it involves fundamentals of sheet-metal drafting, transfer to sheet metal, cutting, bending or breaking, soldering, and finishing. Related information concerning tin plate, allowances, hems, solder, etc., may also be studied in connection with the project.

The following procedure is suggested for the project:

1. Make a full size, accurate drawing of the project.
2. Transfer the drawing to IC or IX bright tin.
3. Using tin snips, carefully cut around the outside line of the metal, be careful that allowances for hems and solder joints are not removed.
4. Bend all hems.
5. Bend the bottom of the holder and the solder allowances up to a 90 degree angle along line A–B.
6. Bend the sides along lines C–D and X–Y making a 90 degree angle with the back. If suitable stakes are not available use a piece of hard wood 1⅝-in. square for this operation.
7. Solder the bottom where it joins the sides.
8. Bend and solder the front part of the bottom.
9. Bend the front along line M–N until a 90 degree angle is formed with the sides.
10. Bend the front solder allowance and solder to the side.
11. Drill or punch a ⅛-in. hole for hanging the project.
12. Smooth any rough surfaces with steel wool. Clean off excess flux.
13. Finish as desired.

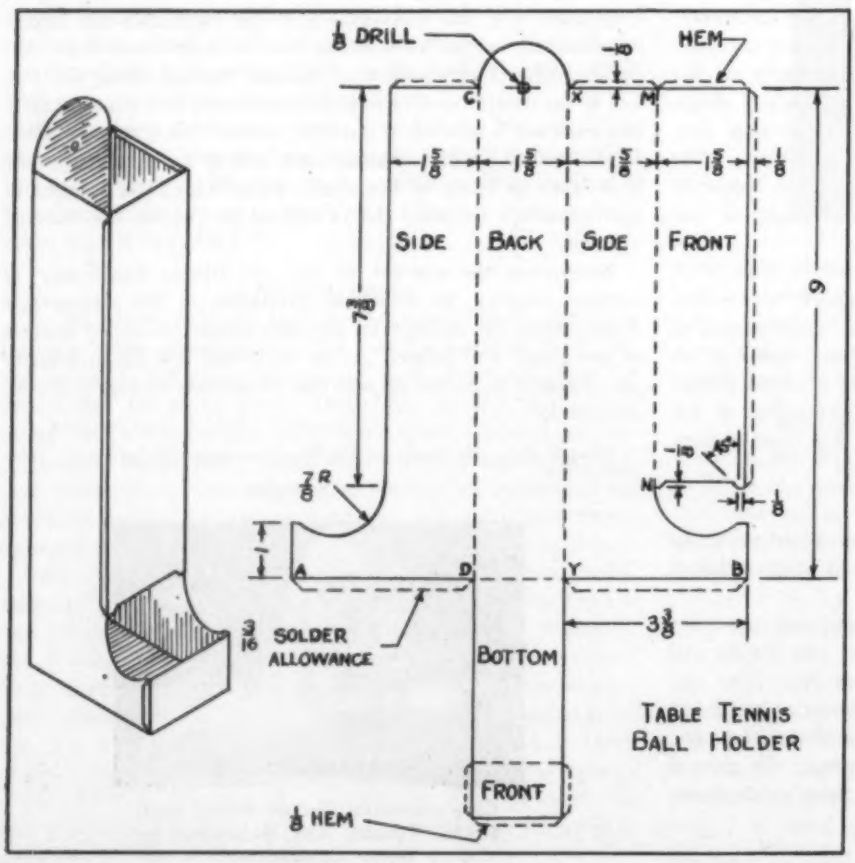


Table tennis ball holder

AN INEXPENSIVE GAS KILN

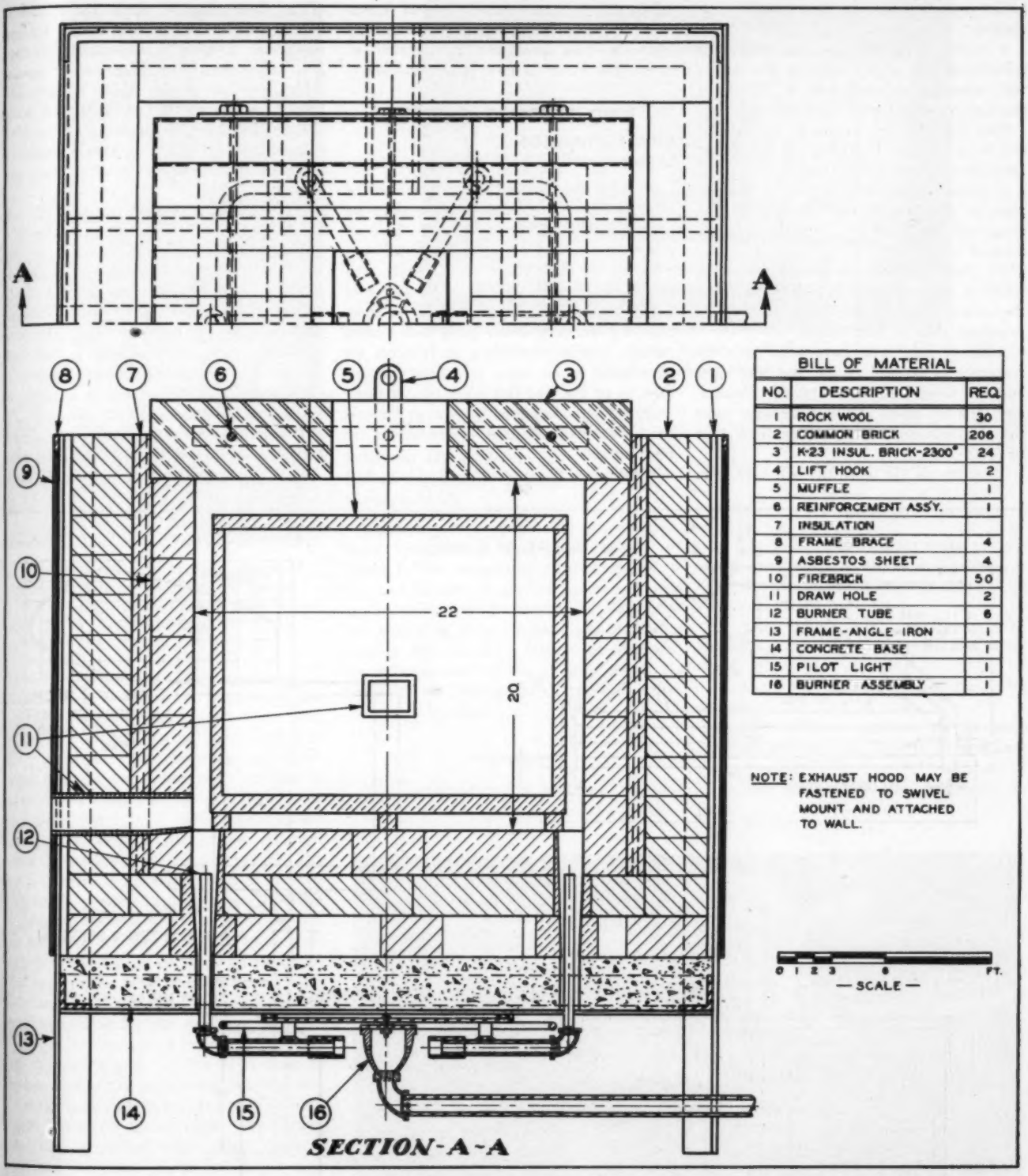
JAMES H. GONCE
Industrial Arts Instructor
Senior High School
Tuscaloosa, Ala.

Ceramics has long been a recognized area in industrial arts, but one quite often neglected. Ceramic materials are plentiful and in the coming shortages of metal and other industrial-art supplies that is an important factor.

One reason given for the lack of ceramic areas in industrial arts has been the cost of an adequate commercial kiln. These kilns, one cubic foot or more in size, range in cost from $200 up. This is a large outlay for an activity usually thought of as of secondary importance.

A pottery kiln can be built in the average general shop for less than $30. To prove this statement the author constructed a gas-fired kiln with a firing chamber 18 in. wide, 22 in. long, and 20 in. high at a cost of $23. The kiln was designed solely from the standpoint of a practical kiln at a minimum cost. Improvements may be made on it to increase its efficiency, but the cost will be raised also.

The base consists of an angle iron frame supporting a 3-in. slab of reinforced concrete. The burners are attached to a steel plate fastened by stringers to the frame. The burner assembly is made up of a 3 by ¾ in. reducer, with 1/16 holes drilled as gas orifices: ¾-in. pipe is fitted 2 in. in front of the gas orifice, the 2-in. space acting as an air mixer. The air supply is controlled by sheet-metal sleeves on the burner pipe. The kiln has six burners. Eight burners would give more even heat and speed up firing time. The burners are lighted by a pilot light which is simply a ring of ¼-in. copper tubing with three 1/16-in. holes drilled at each burner location. The tubing is fastened to the burner assembly. To light the kiln, the gas is turned on to the pilot, which is lighted by a torch; the main burners



BILL OF MATERIAL

NO.	DESCRIPTION	REQ.
1	ROCK WOOL	30
2	COMMON BRICK	208
3	K-23 INSUL. BRICK-2300°	24
4	LIFT HOOK	2
5	MUFFLE	1
6	REINFORCEMENT ASS'Y.	1
7	INSULATION	
8	FRAME BRACE	4
9	ASBESTOS SHEET	4
10	FIREBRICK	50
11	DRAW HOLE	2
12	BURNER TUBE	6
13	FRAME-ANGLE IRON	1
14	CONCRETE BASE	1
15	PILOT LIGHT	1
16	BURNER ASSEMBLY	1

NOTE: EXHAUST HOOD MAY BE FASTENED TO SWIVEL MOUNT AND ATTACHED TO WALL.

0 1 2 3 6 FT.
— SCALE —

Details of a gas fired kiln

are then turned on. When they fire, the pilot is turned off.

The firing chamber is lined with standard firebrick. Split firebrick would be even better. The firebrick is backed up by a layer of fire clay and sawdust (40 per cent clay, 60 per cent sawdust), which acts as high temperature insulation. The sawdust burns out, leaving air holes in the clay. This in turn is backed up by a layer of soft red common brick, and the whole enclosed by sheet asbestos. Between the asbestos and red brick there is a layer of rock wool — this is unnecessary, but aids in keeping the surrounding area cool. The top is made up of 25 HW23 insulating firebrick

bolted together with a 7-in. square flue opening.

A muffle can be built into the kiln, using refractor shelves or split firebrick. The author uses saggers — and has used a 16-in. flue thimble that works well and costs little.

This kiln will fire to cone 02 (2003° F.) in 9 hours, to cone 04 (1922°) in 7½ hours. Maximum temperature is 2300° F.

If insulating firebrick, HW23, is used in place of the firebrick and red common, the firing time can be cut in half and the expense doubled.

No flue connection is needed for draft, which is controlled by a brick placed over the opening. The kiln can be used in a well-ventilated shop without danger.

Kilns of this type have been built by a number of ceramic artists; and with eight burners, using insulating firebrick throughout, they are equal, and in some ways superior, to commercial kilns costing from $400 to $800.

Total cost of the basic kiln will vary from $15 to $30; total cost of the improved version from $75 to $100, depending on refractory prices in your area and the amount of secondhand materials used in construction.

BIRD FEEDING SHELTER

DICK HUTCHINSON
El Monte, Calif.

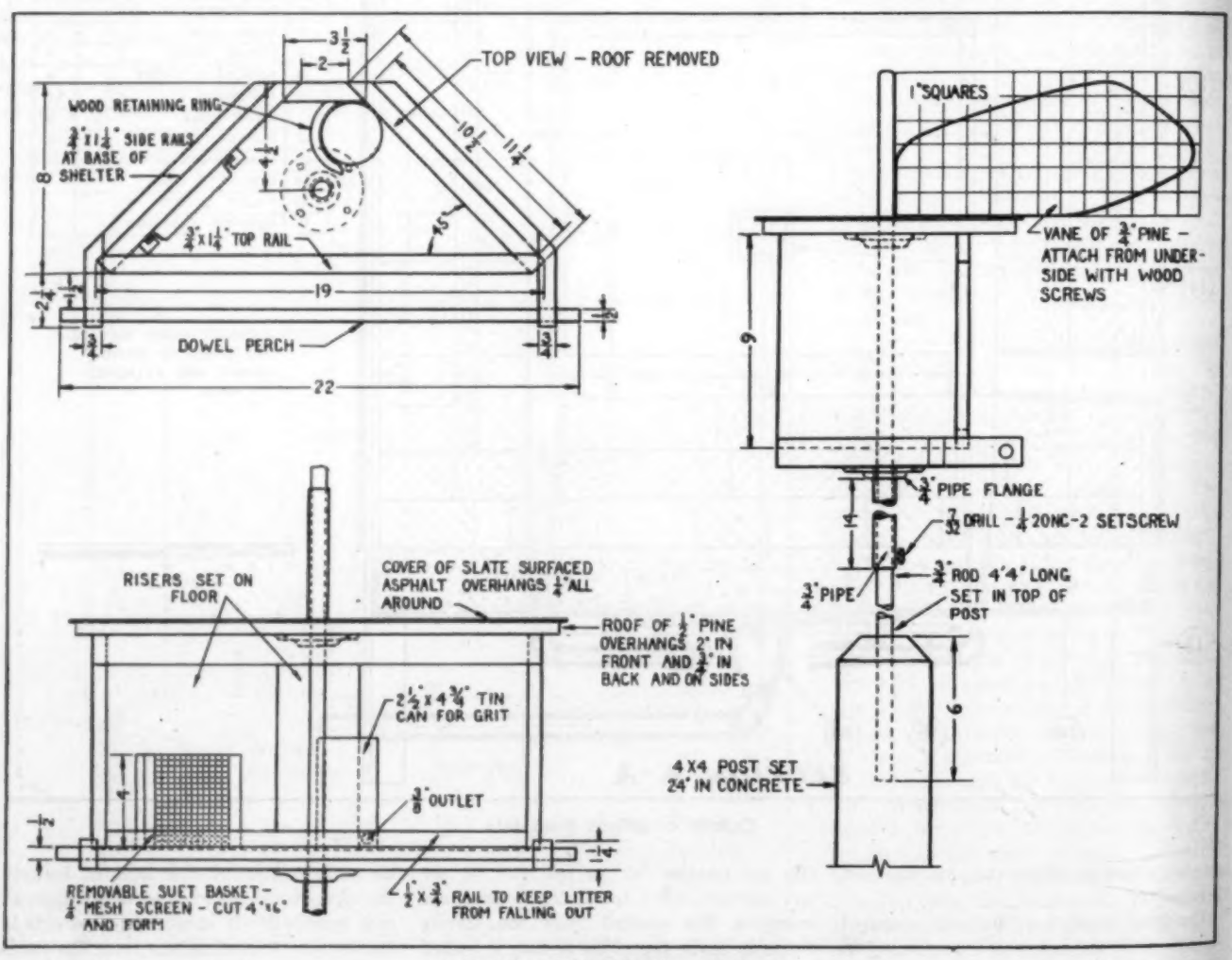
We have just finished the development of a revolving bird feeding shelter that we believe will do much to save the lives of many thousands of our beautiful birds.

As we all know many of our birds, who remain in the north throughout the long cold winters, perish mainly from want of food. Many of our bird lovers build bird feeding shelters, but in most cases the shelters are so situated as to make it difficult for the birds to get the food that is put out for them. The food becomes buried in snow, or the cold winds blow in, making it hazardous for the birds to eat.

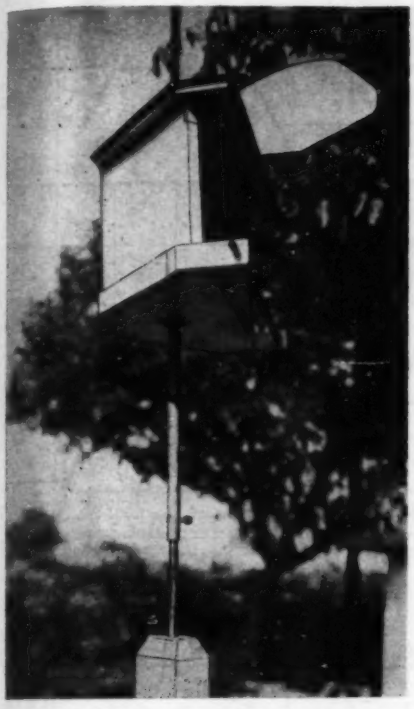
We designed the shelter described here, with all of these things in mind. The shelter is built so that it will revolve, always keeping its back to the wind. It is equipped with floor area large enough to accommodate several birds at a time. A suet basket is built into one side of the shelter and, since birds must have grit, we have equipped our shelter with a grit dispenser. Water is always available, or, if fresh water is not available they can eat snow.

The shelter is pivoted on a ¾-in. rod, which is set down into the top of a 4 by 4-in. post. A 14-in. length of pipe is fitted over the rod, and a setscrew is threaded into one side of the pipe. By releasing the pipe by simply turning the setscrew, the shelter is lowered while putting in fresh food, suet, and sharp sand in the grit box, then it is pushed back up and the setscrew is tightened, making it impossible for prowling cats or squirrels to get at it. (See drawing of side elevation.)

Dimensioned drawings show pretty clearly just how the shelter is made and assembled. All of the parts except the roof are of ¾-in.


TOP VIEW – ROOF REMOVED
WOOD RETAINING RING
¾"x1¼" SIDE RAILS AT BASE OF SHELTER
¾"x1¼" TOP RAIL
DOWEL PERCH
19
22
45°
1" SQUARES
VANE OF ¾" PINE – ATTACH FROM UNDERSIDE WITH WOOD SCREWS
¾" PIPE FLANGE
7/32 DRILL – ¼-20NC-2 SETSCREW
¾" ROD 4'4" LONG SET IN TOP OF POST
¾" PIPE
4X4 POST SET 24" IN CONCRETE
RISERS SET ON FLOOR
COVER OF SLATE SURFACED ASPHALT OVERHANGS ½" ALL AROUND
ROOF OF ½" PINE OVERHANGS 2" IN FRONT AND ¾" IN BACK AND ON SIDES
2½"x4¾" TIN CAN FOR GRIT
⅜" OUTLET
REMOVABLE SUET BASKET – ¼" MESH SCREEN – CUT 4"x6" AND FORM
½"x¾" RAIL TO KEEP LITTER FROM FALLING OUT

Details of bird feeding shelter



A profile of the shelter elevated only part way in order to photograph it so that top of post would show

pine. The roof is of ½-in. pine, and is covered with slate surfaced asphalt roofing material, and the propeller is of ¾-in. pine.

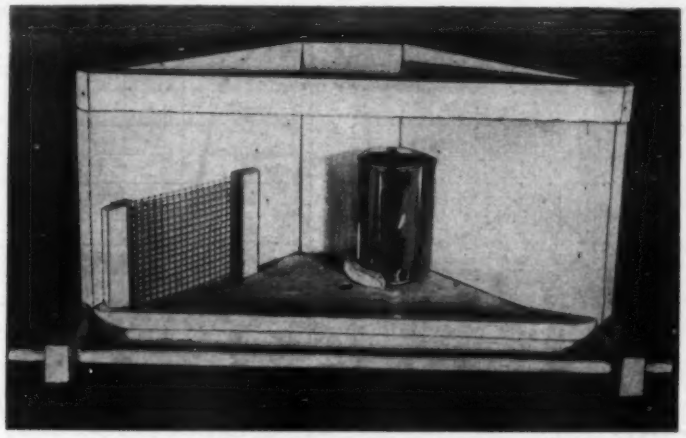
The suet basket is formed from a piece of ¼-in. mesh galvanized screening, and slides down into the two guide posts, making it removable for cleaning. The grit dispenser is an ordinary beer can. A ⅜-in. hole is drilled through the side at the bottom, through which the sand may sift down as needed. The can is painted, and is held in place by a wood step which is nailed in place. (See drawing.)

Holes are drilled through the center of both the floor and the roof, and a 1/16-in. steel plate is screwed under each hole as a bearing.

A large washer is slipped over the rod and rests on top of the pipe, thus providing an excellent bearing for the revolving feeder.

Set a 4 by 4-in. post 6 ft. long, 2 ft. down into a concrete post. Drill a ¾-in. hole in the top, and set the ¾-in. rod down into this. Paint the house and the post any color desired. Bright colors do attract birds. The shelter illustrated is painted cream color, with a red roof.

In addition to suet, and the grit, keep the feeder well supplied with small grains, or ground grain, crushed sunflower seed, crushed fresh peanuts, and bread crumbs. This attended to, you will have plenty of birds that you can number as your best friends.



The assembled shelter before roof was applied and before painting

TIN AIRPLANE MODEL

WILLIAM LEE HODGE
Palmer Elementary School
Springfield, Ill.

Elementary and junior high school boys enjoy making the tin airplane shown in Figure 1. Their enjoyment is furthered by the fact that the finished airplane can be mounted on the handle bars of a bicycle. Not only does the making of such a project give excellent practice with tin snips, but it also involves the soldering and bending of light metal. If preferred, the airplane may be used only as a toy or a knickknack.

Materials

Any antifreeze can or five-quart oil can will furnish the material needed for this project. I. c. tin or aluminum may be used if desired. A strip of 3/32 by ½ by 15-in. band steel also will be required.

Procedure

1. On ½-in. squared paper make a drawing of the airplane as shown in Figure 2.
2. Obtain a 7 by 7¼-in. piece of light tin from a large tin can.
3. Using carbon paper, trace the airplane, windshield, and rudder on a piece of cardboard.
4. Cut out cardboard patterns with scissors.
5. Lay cardboard patterns on tin plate and trace around them. Draw in all bend lines with a scriber.
6. Cut out airplane and parts with tin snips.

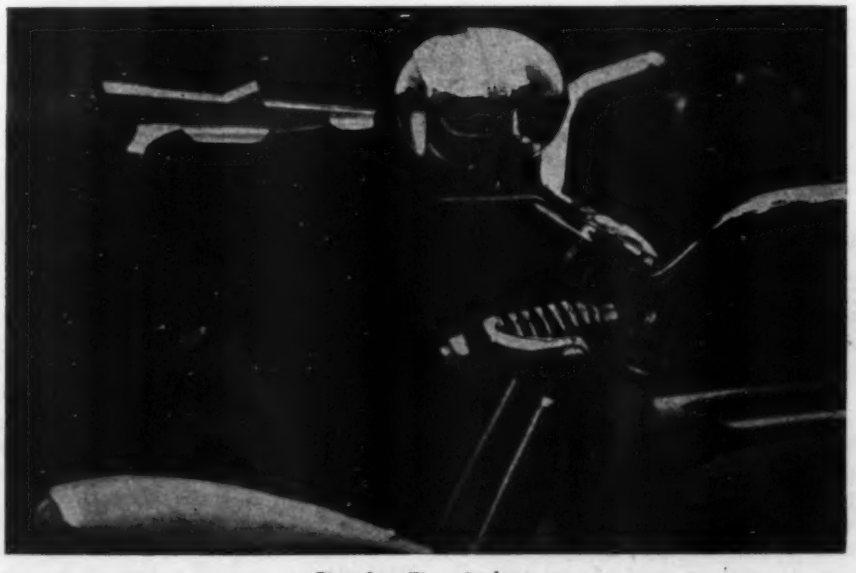


Fig. 1. Tin airplane

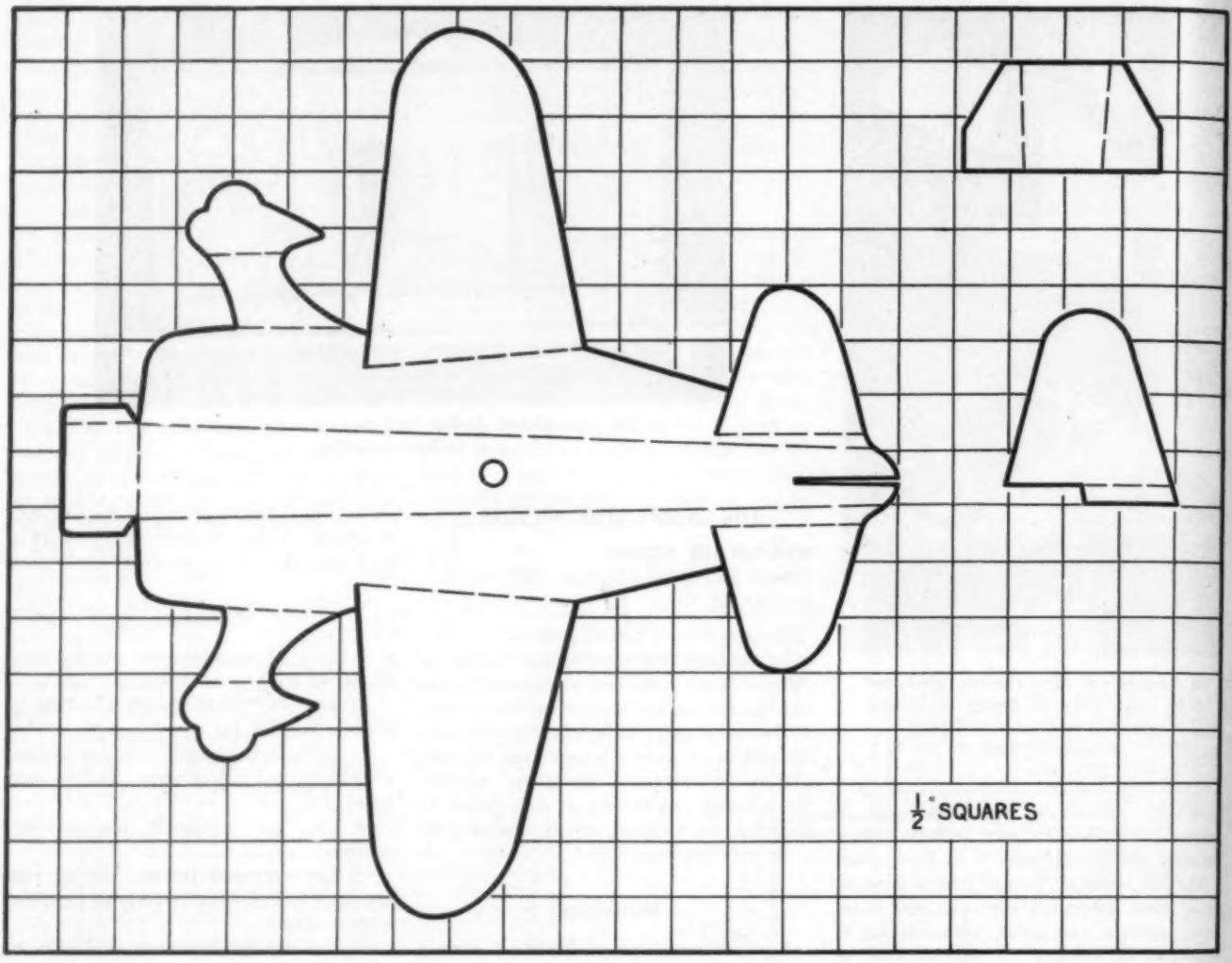


Fig. 2. Tin airplane

7. File edges to remove burrs and sharp points.

8. Steel wool all edges to be soldered, i.e., nose-joint flaps, rudder flap, and rudder slot (underside).

9. Drill 16/64 in. dia. hole for band steel support bolt.

10. Drill ⅛-in. dia. hole for propeller shaft.

11. Bend airplane to shape, bending fuselage first, then tail, then wings, and finally the landing-gear.

12. Solder nose joint and rudder in place.

13. Design and cut propeller of scrap tin.

14. Use the head portion of a 10-penny box nail for a propeller shaft. Attach propeller to airplane by soldering shaft in place. Use the number of washers desired, or make washers by drilling a number of ⅛-in. dia. holes in the scraps of sheet tin and then cutting around the holes to form washers.

HANDY SCRAP RACK FOR THE MACHINE SHOP

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Machine Shop Instructor
Veterans Training Program
Bok Vocational-Technical School (Annex)
Philadelphia, Pa.

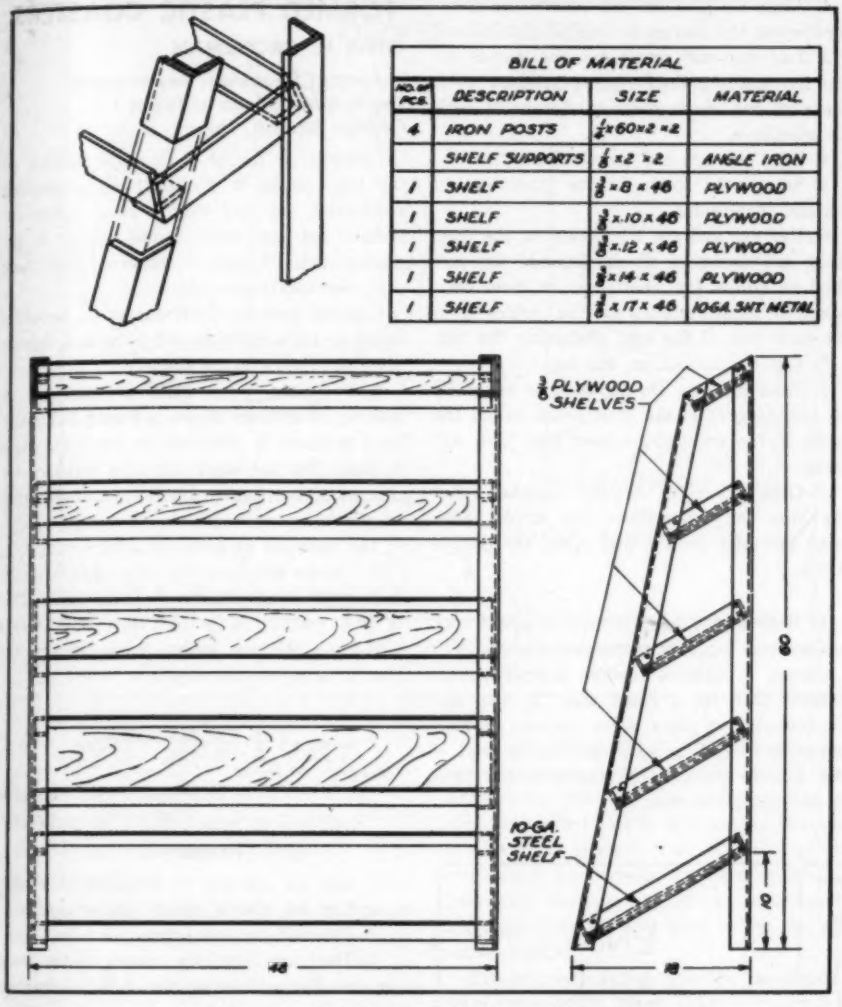
Every vocational school machine shop has a scrap box, a place where odds and ends of material are kept, with the idea that they will be used when needed. The box is soon filled, and the piece that is usable seems always buried under unwanted debris. The scrap pile increases until clean-up day and is then thrown out — a needless waste of time and material.

With these conditions in mind, we built as a shop project, an improved scrap rack. This rack was designed to keep all discarded pieces of material in full view and easily accessible.

The project was made of four angle iron uprights or posts about 5 ft. high, spaced to make a rack about 4 ft long, or any desired length, and about 18 in. in depth at the bottom, and about 8 in. in depth at the top.

The important features are the sloping shelves and the very limited depth of the bins. These shelves, spaced about 12 in. above each other are supported by angle iron ⅛ by 2 by ½ in. The sloping shelves and receding front posts combine to make accessible every piece of scrap in the rack. The narrow angle iron edges prevent any great accumulation upon any shelf.

We used ⅜-in. plywood for all shelves except the one nearest the floor. This one was made of 10-ga. sheet steel. These materials were used because they were available.


BILL OF MATERIAL
NO. OF PCS. | DESCRIPTION | SIZE | MATERIAL
4 | IRON POSTS | ¼ x 60 x 2 x 2 |
| SHELF SUPPORTS | ⅛ x 2 x 2 | ANGLE IRON
1 | SHELF | ⅜ x 8 x 46 | PLYWOOD
1 | SHELF | ⅜ x 10 x 46 | PLYWOOD
1 | SHELF | ⅜ x 12 x 46 | PLYWOOD
1 | SHELF | ⅜ x 14 x 46 | PLYWOOD
1 | SHELF | ⅜ x 17 x 46 | 10GA. SHT. METAL
⅜ PLYWOOD SHELVES
10-GA. STEEL SHELF
8
2
46
18

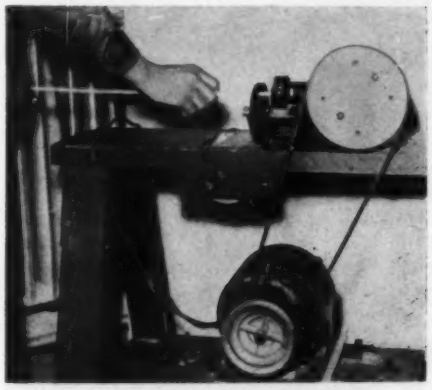
Handy scrap rack for vocational machine shop

A rack of this design can be built of almost any material on hand, and will prove to be a worth-while project and a valuable piece of equipment in any school machine shop.

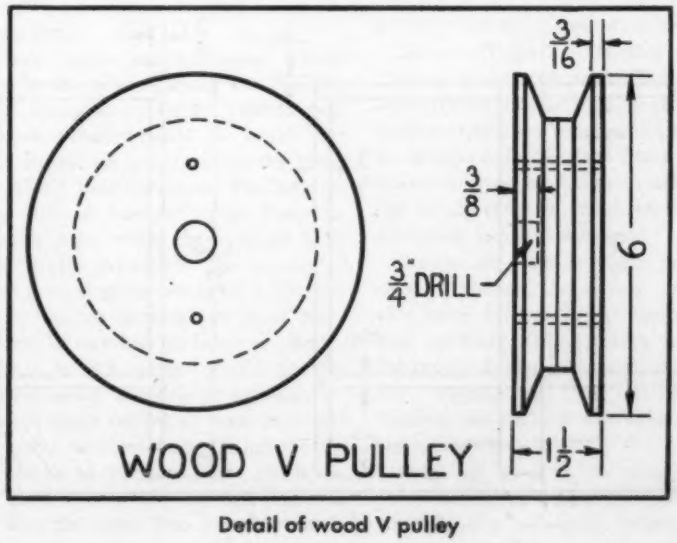
MOTOR POWERED DOWEL CUTTER

MELVIN HAM
Industrial Arts Instructor
Choteau, Mont.

A hand dowel machine can easily be converted into a power tool by replacing the crank with a wood pulley for a V belt. Make about a 6-in. hardwood pulley on your lathe. It is necessary to make a recess in the center of the pulley in order that it will fit over the hub of the gear. Drill two holes opposite each other at an equal distance from the center. There is already a threaded hole in the gear and if one of the holes in the pulley is located to coincide with this hole, there remains only one hole to be drilled through the gear. It may either be drilled and tapped or a bolt with a nut may be used. Cut the same size V in the pulley that is in the pulley on the motor. Since this is not a high speed machine, it will be necessary to use a very small pulley on the motor in order not to attain too high a speed on the machine. A gear ratio of 1:6 with a ¼ h.p. motor should give the proper speed and ample power.



Motor powered dowel cutter



Detail of wood V pulley

SMALL END TABLE FOR BEGINNING CLASSES

CHARLES W. ALLEN
Instructor
Southern Illinois University
Carbondale, Ill.

The end table described herein was designed for classes in beginning woodworking. It is suggested that it be used as a second or third project in the course, after the student has had an opportunity to gain a small amount of skill in the use of the jack plane.

Almost any type of hardwood may be used. Usually, an effort should be made to get the

student to select a wood and type of finish that will go well with existing furniture in his home; thus greater interest and better teaching results will be obtained.

The following procedure for construction is suggested:

1. Square and glue up stock for the top and shelf. It is usually advisable to include at least one edge glue joint in a piece of this width. Either an edge or doweled edge glue joint may be used.

2. After the glue has set, square the stock for the top and shelves to finished dimensions.

3. Lay out and rough cut the curves on the top and the shelf with a handsaw or a backsaw, and finish them to dimension with a spokeshave.

4. Sand the top and the shelf.

5. Square the stock for the three legs to finished dimensions.

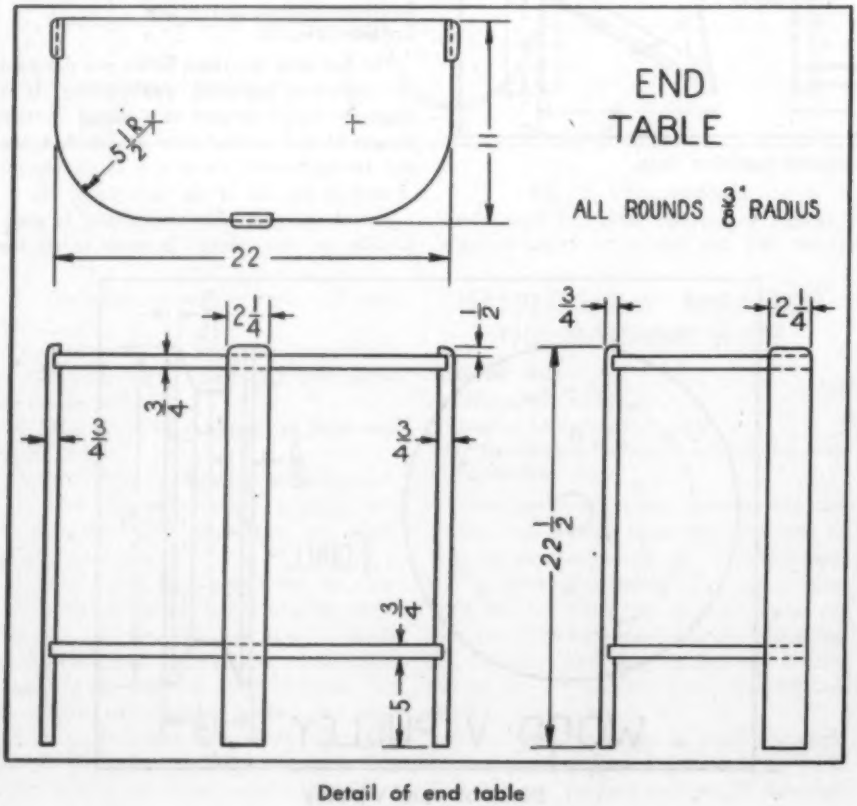
6. Lay out and cut the dadoes in the legs, using the thickness of the finished top and shelf as guides for measuring the dado cuts. Make all measurements for the dadoes from the same end of the legs, preferably the top.

7. Cut the rounds on the legs.

8. Sand the legs. Do not sand or use a file on the dadoes, as the dust tends to fill the pores of the wood and a poor glue joint will result.

9. Glue and clamp the table together. After the glue has set, remove the surplus glue, sand the table lightly, and apply the desired finish.

If desired, the legs may be attached with screws and plugs, in which event it will be necessary to make the dadoes somewhat more shallow than for a glued joint. It may also be advisable to put a slight chamfer (usually about 1/16 in.) around the bottom end of the legs to prevent splintering if the table is slid along the floor.



Detail of end table

FORMED PLASTIC COASTERS

CHRIS H. GRONEMAN

Industrial Education Department
The A & M College of Texas
College Station, Tex.

Plexiglas or Lucite table appointments of the type shown in Figure 1 make pleasing accessories for any dining room table ensemble. An item such as the coaster is appealing even though it requires little more than elementary procedure.

Coasters prevent water marks on beautiful linens or table surfaces and provide a definite place for the beverage glass.

A two-piece wood mold is employed in making the coasters shown in Figure 1. Usually hand pressure is adequate to force the mold in place. Do not exert excessive pressure for this will leave the imprint of the wood grain on the hot plastic.

The edge can be trued up after forming.

A feature displayed by this coaster is the monogram which is cut into the base. This is most satisfactorily cut from the bottom side to make the design more impressive; that is, give it more depth.

BILL OF MATERIAL

Quantity	*Name*	*Material*	*Size*
1	Coaster	Plastic Plastic dye	⅛ x 5 dia.

Procedure

1. Lay out pattern on Plexiglas or Lucite.
2. Cut out with a coping, jig, or band saw.
3. Decorate or monogram the base.
4. Heat and form the coaster in the wood jig. See Figure 2 for details of jig for forming the coaster.
5. Mark and cut the rim.
6. File the rim edge.
7. Sand the rim edge.
8. Buff the rim if desired.
9. Tint the coaster if preferred.
10. Apply a coat of wax and polish with a soft cloth.

Fig. 1. Formed plastic coaster

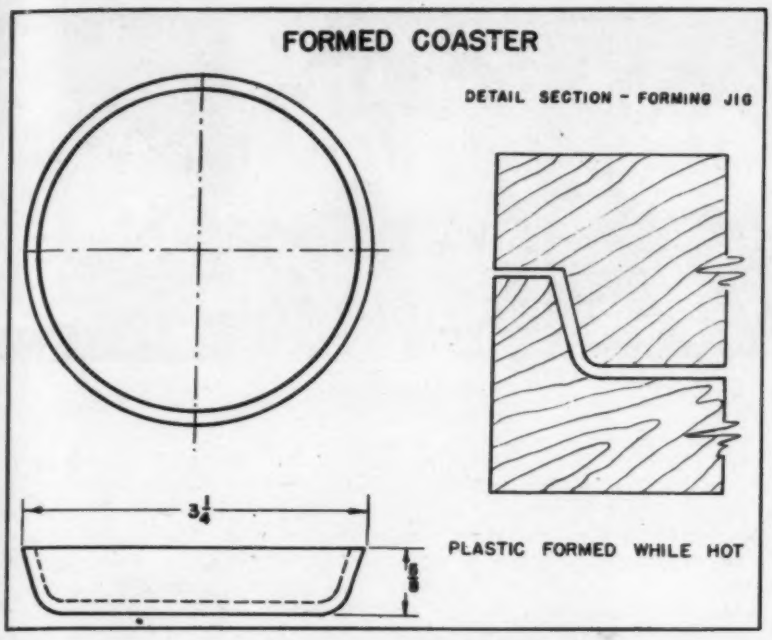


Fig. 2. Details of jig for forming plastic coaster

PRINT SHOP SAFETY

LEROY BREWINGTON
Supervisor, Department of Printing
Kansas State Teachers College
Pittsburg, Kans.

Shop safety should *always* be an integral part of the shop program. Whenever and wherever correct manipulative skills are taught, the safety of worker and materials should be taught.

Accidents can be eliminated for long periods of time when there is a will to do so. People learn most efficiently by doing. To reduce or prevent accidents by minimizing experiences and forbidding the use of machines and tools will not equip the individual worker with the skills, experiences, and knowledges so important in correct use of our modern machines. Broad experiences, carefully directed by competent teachers, will achieve remarkable results in making safety-conscious workers in school shops and in industry.

A record of distilled experience, compiled by the National Safety Council, shows that most accidents in job and newspaper printing establishments can be traced to six sources:

1. Handling roll and flat stock
2. Floors
3. Hand tools
4. Operation of the presses
5. Clothing
6. Handling equipment, such as rollers, smut rolls, etc.

Any management or administration-sponsored program to prevent accidents should have as its first step the provision of a safe shop in which to work. But even a plant that is absolutely perfect from both an accident prevention and production standpoint is no insurance whatever against the occurrence of accidents — unless you plan to let the plant stand empty.

Safety consciousness can be developed in even the smallest plant. When it is so developed, the likelihood of accidents is almost negligible.

There are certain fundamental policies that may be adopted to apply to any type of manual-activated shop. A few may be mentioned here.

The most serious and permanent injuries occurring in the printing trade are those involved in operation of rotary, cylinder, and platen presses. Safety treads, toe boards, and handrails should be provided for the upper sections of all large machines. The habit of removing bits of foreign matter from the forms on a press when the machine is in operation is very dangerous. The operator of the platen press must be impressed by the fact that if he reaches through the press for a fallen sheet, he may lose his hand, or possibly his entire arm. All presses should be shut down before oiling, cleaning, or adjusting.

Automatic paper cutters are now fairly well guarded, most of them necessitating the use of both hands in bringing down the blade. A hand on a lever is not one that comes in contact with the knife. Two workmen should never operate the same machine at the same time.

There is little danger from accidents on monotype and linotype machines, as the machines are well guarded against squirts and possible contact with gears and belts.

The factor of fatigue in accidents should not be overlooked. A man who is fatigued does not see, does not hear, does not understand, and does not act with his accustomed speed. He may hear a warning cry and dimly understand its meaning, yet he may be so mentally dulled by fatigue that the accident occurs before he can summon his will and wits to act.

An all-inclusive rule should be good housekeeping. A worker doesn't take care of his equipment and manage his time and habits efficiently because of an inherited instinct. He must be taught that rules materialize because they are needed. That they must be followed to be of direct benefit to the worker or learner. That rules may spell the difference between success and failure in many instances. The following points may serve to illustrate good housekeeping which results in a safe shop.

File materials carefully. Avoid the temptation to throw one more piece on top of another because one may be using it soon. There is a neatness to systematic stacking of supplies and materials. Don't stack paper stock too high or have the edges uneven. These may cause the worker a lot of falls, bruises, cuts, or loss of temper.

Tools should be carried or passed, never thrown or tossed, from one place to another or from one level to another. Conveyers, trucks, or carts are the correct media for transporting heavy amounts of materials or large pieces of equipment. It may be necessary to use a set of rollers, levers, or pulleys to move heavy objects. Protect your health by not risking or exposing your physical being to mistreatment, abuse, or strain.

Use extreme care in handling oils, gasoline, cleaning fluids, and acids. This is for one's own protection. The mind should be indelibly impressed with the danger of careless handling of dangerous fluids. Such fluids as oil, when spilled on floors or stairways, can easily cause one to slip and fall, doing serious or possible permanent physical damage.

Return all tools to their proper storage cribs or cabinets. The average worker is probably more careless in the handling of tools than in other items. Always place tools in the proper storage place whether it be a toolbox, drawer, crib, box, or rack. Careless handling and negligence of tools result in loss and accidents.

Place old rags in the proper receptacle, which is supposed to be covered. Don't leave oily or greasy rags under tables, benches, or

strewn from one end of the room to the other. Not only are these rags hazardous but they also indicate poor work habits of the workers.

Ample fire extinguishers should be installed at convenient places in every shop. They should be made easily accessible, within sight, and properly marked for emergency use. Don't permit the extinguisher to be used as hat racks or to be draped with tools or other implements.

All equipment should be kept clean of dirt, grease, and oil. Machinery should be painted with the proper colors to instill cleanliness of shop and ease to the worker's eyes. Proper colors have a psychological effect to the eyes.

Be neat in locker room and washroom. One should be as clean there is he is in any other part of the shop. He should treat the facilities as he would if they were his own personal property. It is almost a rule that if one is sloppy, negligent, and indifferent in the use of the locker room, rest room, or wash room, he will be found guilty of the same habits elsewhere in the shop or even at home.

Poor light is an enemy of safety. Inadequate light is dangerous. Insufficient light may cause one to fall on a stairway, cut a finger, ruin a job, induce eyestrain, permit errors in measurements and assembling.

In the bindery, one must guard against loose clothing, long hair, or fingers becoming caught in fast moving machines. Paper cutting knives in storage should be guarded. When on working machines, the hands should be removed from the cutting path before the knife is placed in action.

These statements of precautionary measures are general in nature. Similar safety habits should be developed in other operations and procedures similar to these mentioned. In a broad sense safety is the application of common sense. Think twice before you act. It may mean a life, finger, eyesight, or possibly a promotion in the shop.

Handmade paper

teresting projects into a valuable, artistic piece of work that can be treasured as a keepsake, and is also suitable for framing.

The making of paper by hand, although an ancient art, has been found to have an interesting effect on students. Most of them show enthusiasm in this activity. The necessary steps in making paper by hand, although limited, are somewhat similar to those of a machine. Students bring in clean white rags. The rags are cut into small pieces about a half-inch square and ground in a mortar and pestle, or macerated with the square blunt end of a spatula until they become fibrous. Pulp may be also obtained from a mill. Pulp, whether made by machine or by hand must be beaten to a fine, creamy consistency with a large egg beater. When the pulp is ready for use, place it in a wooden or galvanized tub. The molding process now begins. Make a wood frame of desirable dimensions, and stretch a brass screen over it. The mold is to be fitted into a second frame called the deckle. The screen should be made of brass, and have 30 to 35 wires per square inch.

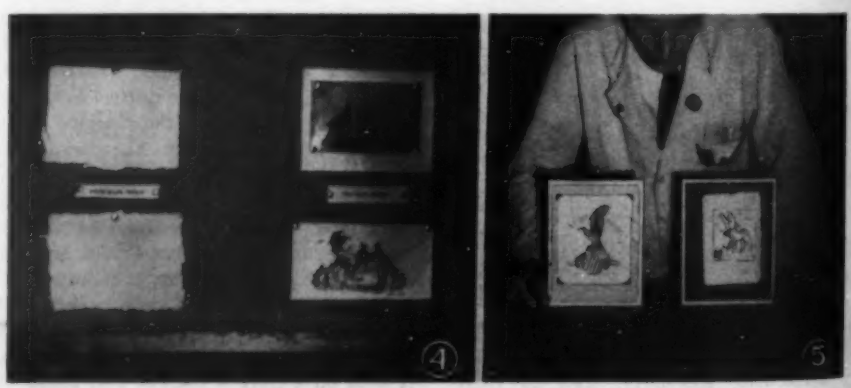
In making the sheet place the pulp into the tub and add water. A consistency of approximately 2 per cent pulp to 98 per cent water is necessary. Stir the contents with a wooden paddle, always having the fibers in suspension, floating at the surface of the water. Now, the deckle frame is placed on the mold and dipped edge down into the stirred-up pulp. When the mold has been placed well below the surface, and sufficient fibers have been gathered, it should be turned horizontally and carefully drawn out of the water. As the water drains out, shake the mold back and forth several times to cause the fibers to intertwine and thereby form a stronger sheet of paper.

When the pulp is evenly distributed over the screen, remove the deckle and lay a piece of felt over the mold. To transfer the pulp from the screen, use a rocker, or merely rub your hand over the back of the felt. In removing the felt, start at one corner and raise carefully. In doing so the pulp draws with the felt. If the formation of the sheet seems to break as it comes off the screen, place the felt down again and give the back another going over with the rocker or the hand motion. After removing the felt with the pulp on it, place a second piece on the first, then another. As many as 7 to 9 sheets may be stacked together. This stack of felts with water-soaked sheets may be placed on any press or machine that will apply an amount of pressure sufficient to squeeze the water out. If no such press is obtainable, a wringer

A DRY-POINT ETCHING ON HANDMADE PAPER

JOHN M. FONTANA
State Teachers College
Oswego, N. Y.

A report from the office of the Commissioner of Education, Bulletin 1937, No. 34, on "Industrial Arts in American schools," states concisely the place of the industrial-arts shop. In the listing of recommendations there is one that strikes the fancy of the graphic-arts shop, and that is: "Industrial arts satisfies the desire of boys and girls to create useful things." How true this is in our shop where amongst an enriched curriculum we combine two in-



Examples of dry-point etching

will do. If at times it appears difficult to remove the pulp from the screen, it would be advisable to have a number of papermaking screen molds and several deckles. With such a supply the pulp could remain on the mold for several hours to dry, thereby eliminating the use of papermaking felts. Oddly enough, this is the original, old Chinese way of making paper. With our handmade paper finished and the project successfully accomplished, we are ready to work on the dry-point etching.

Dry-point etchings made from lumarith or celluloid, .03 to .04 in. in thickness, if properly handled, are as distinctive in character as etchings made from copperplate. A variety of subjects may be reproduced. Care should be exercised in selecting a suitable copy. Subjects showing thin and thick lines, landscape and greeting cards, lend themselves very well to this medium.

The copy to be reproduced can be a printed picture or an original drawing. Cut a piece of celluloid larger than the subject to be etched, and tack it over the picture on a drawing board. Take a dry-point needle (can be purchased, or made with a phonograph needle mounted in a wood handle) and carefully holding it perpendicular, trace the lines by scratching into the celluloid. The etch should not be too deep, and the scratch lines are not to be touched. The burr of the lines helps to retain the ink that is to be reproduced. Therefore it would be best to start the scratching process from the upper left hand corner and work downward, finishing all the details in one area without going back for a re-etch. In order to check on the progress made before the plate is finished, take a piece of black paper and place it between the celluloid and the subject to get an idea of how the etched plate looks away from the picture it is tacked on. A light etch is necessary for fine lines and a heavier depth and width is required for black lines. Cross-hatching may be used for dark areas and shadows. Darkness of print can be attained by etching lines close to each other. When the plate is finished, and trimmed with knife or scissors to desired size, it is ready for prints.

The etched plate is now placed on several sheets of scrap newspaper, and inked with Bond Black or etcher's ink, a small brayer is passed back and forth until all the incised lines are inked. This can be checked by putting the etched plate up to the light and looking through it. If certain lines aren't completely covered with ink, the brayer should be used again until the ink finds its way in every incised line. When this is done, the plate is wiped with a stiff cloth and then by the palm of the hand covered with powder. All the ink on the surface must be cleaned off, or, if desired, light sections of partly brushed-off ink may remain on the plate for background effect. Now, take a sheet of handmade paper and place it over the inked plate. On top of it lay two or three blotters and run through the etching press. Remove the blotters and lift the paper off the plate. For each print repeat the inking and cleaning process. The pressure on the steel cylinders of the etching press can be regulated by thumb screws. Even pressure is important for a successful reproduction. Again the wringer can be used in the absence of the press. If difficulty is encountered in securing a satisfactory print it may be advisable to moisten the sheet of paper before placing it on the inked plate.

Here is a combination of two fine projects combined into one that will stir a student's imagination from the moment it is mentioned. Each ensuing operation is vitally interesting. This interest is sustained, and terminates with a satisfied feeling of an interesting task well done.

LAMP BASE PROJECT

JOSEPH LUPKIN
Industrial Arts Instructor
Junior High School
Port Chester, N. Y.

This original lamp base project is suitable for an industrial-arts class. It is a good project because it presents many valuable lessons and related material information.

Instruction and Operation Sheet

BILL OF MATERIAL

No. of pcs.	*Name*	*Size*
2	Gumwood	1½ x 6½ x 16 in.
2	Walnut	⅞ x 6½ x 16 in.
2	Maple	⅞ x 6½ x 16 in.
1	Lamp bushing	⅜ in.
1	Threaded pipe	⅜ in. x 2 in.
1	Chain pull socket	
1	Lamp harp	
1	Length of lamp wire	8 in.
1	Male plug	
2	Burlap cloth (pads)	
	Boiled linseed oil	
	Clear shellac	
	Natural wood filler	
	Felt circle	6-in. diameter
	Sandpaper, medium and fine grades	
	Glue, Franklin Hide Glue or any other good grade of glue	

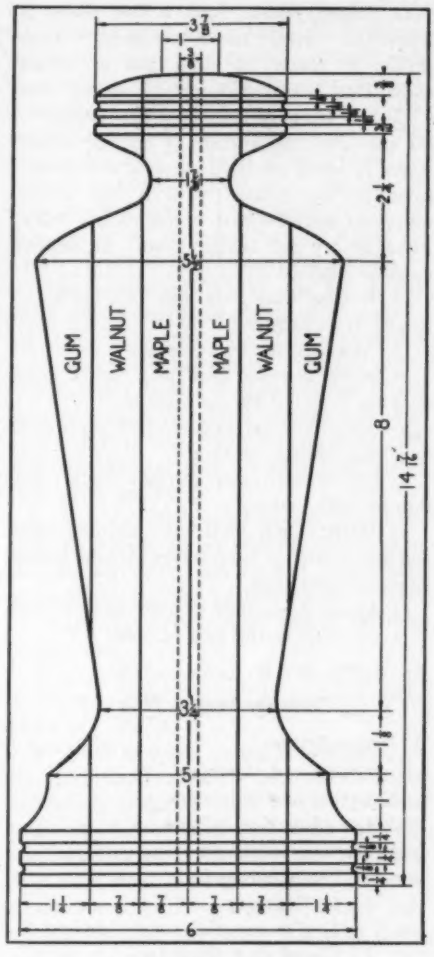
Procedure

Operation and processes

1. Select, measure, and cut to size the lumber for the base.

2. Cut dado in center pieces ⅜ by 3/16 in. for wire.

3. Glue lumber so that the grain in all pieces is running in the same direction. Place pieces of lumber in sequence given in diagram. Clamp tightly and permit to set for about 24 hours.



Lamp base project

4. Find and center punch lightly the center in each end of the glued mass of lumber. Heavy pieces are driven by a small faceplate.

5. Place lumber between centers on lathe so that it is fixed firmly, yet turns easily between centers.

6. Turn the entire piece to largest diameter 6 in., at slow speed.

7. Lay out all diameters and turn to required dimensions and contours.

8. Sand all surfaces first with medium and finally with fine grade sandpaper.

9. Bore hole from side of base to center for bushing and wire exit.

10. Brush on wood filler on small area of surface. When the filler starts taking on a dull appearance turn the power on and rub across the grain with the burlap cloth. Continue in this manner over the entire surface. Allow to dry for 24 hours.

11. Shellac with clear shellac as a foundation for French polish.

12. French polish. Pour a few drops of linseed oil (boiled) and a few drops of clear shellac in center of clean pad of burlap cloth. Double pad and apply it to the base while the lathe is running. Press firmly on the pad until the mixture of oil and shellac starts to settle on the base as a fine polish. Continue this process until a high polish results or until the base begins to feel tacky. Allow to dry and continue until the desired finish is obtained.

13. Remove base from lathe. Cut off extra lengths from each end.

14. Assemble electrical fixtures:

a) Screw threaded pipe into top of base allowing ½-in. to remain exposed.

b) Screw bushing into side of base until it is flush against the base.

c) Pull electric wire through center and through side bushing.

d) Mount lamp harp over exposed plug and attach wire to lamp socket. Mount socket upon threaded pipe.

e) Attach prong plug to other end of wire.

f) Glue felt to the base of lamp.

Teacher Lesson Plan

I. Demonstration
- 1. Gluing and clamping
- 2. Laying out dimensions
- 3. Use of outside calipers
- 4. Turning operations
  - *a*) Use of gouge for
    - 1) Roughing
    - 2) Concave and convex designs
  - *b*) Use of skew chisel for
    - 1) Cutting bevels
    - 2) Cutting V designs
    - 3) Cutting tapers
  - *c*) Use of parting tool for
    - 1) Laying out to diameters
    - 2) Cutting off stock
  - *d*) Sanding on lathe
  - *e*) Applying wood filler on lathe
  - *f*) Applying French polish on lathe
- 5. Boring holes by hand and drill press
- 6. Wiring a lamp

II. Related information
- 1. Make a drawing of the project to scale
- 2. Ability to recognize different kinds of lumber and properties of each
- 3. Safety rules in use of wood-turning tools, speeds, sharpening tools, and assembly of electric wiring devices
- 4. Social benefits
  - *a*) Pride in accomplishment
  - *b*) Recognition of worth-while place in society as a wood turner
  - *c*) Economic value and appreciation of the project both as to usefulness and beauty as well as to its monetary value.

INDUSTRIAL-ARTS PLANS FOR THE YEAR AHEAD

SHRIVER L. COOVER

Director, Industrial Arts Department
State Teachers College
California, Pa.

The cabinet members elected by the Industrial Arts Policies and Planning Committee of the Industrial Arts Division of the American Vocational Association met in the Washington, D. C., headquarters of the AVA on February 12, 13, and 14, 1951.

Those in attendance were Verne L. Pickens, chairman, Division of Practical Arts, Vocational and Family Life Education, Kansas City, Mo.; Dr. Stanley J. Pawelek, supervisor of industrial education, Baltimore, Md.; Dr. Chris H. Groneman, head, Industrial Education Department, the A. & M. College of Texas, College Station, Tex.; and Dr. Shriver L. Coover, head of the industrial arts department, State Teachers College, California, Pa.

The ex-officio members were: Dr. Roy Fales, vice-president of the AVA for Industrial Arts, and chief of the Bureau of Industrial Arts Education, State Education Department, Albany, N. Y.; Dr. John Ludington, specialist in industrial arts, U. S. Office of Education, Washington, D. C.; and Dr. M. D. Mobley, AVA executive-secretary.

The meetings were presided over by Dr. Coover, chairman.

Some of the important problems which received the attention of the group were: ways and means of increasing membership in the AVA; the contributions of industrial arts in the present emergency; and the industrial-arts yearbook; and suggestions for the industrial-arts section programs of the 1951 AVA Convention to be held in Minneapolis.

Other items of business included suggestions that a series of articles be prepared for our professional magazine delineating more specifically than has been done in the past, the place and function of industrial-arts education in the public schools; and the consideration of a new bulletin in industrial arts to replace, "Improving Instruction in Industrial Arts." This bulletin attained the widest circulation of any ever published by the AVA.

Another publication produced by the AVA entitled, "State Supervision," is to be rewritten under the caption of "State and Local Supervision."

The committee was advised by Mobley and Ludington of Legislative measures affecting industrial arts and the probable role it might be expected to fulfill in the prolonged emergency period. It was pointed out that teachers should encourage high school age boys to remain in school. This is upon the recommendation of the Defense Department's Committee on Education Liaison whose members include educational representatives from the army, navy, air force, U. S. Office of Education, and the American Council on Education. The group was told that qualified youth should be encouraged to intensify studies in the fields of mathematics, science, and industrial arts with emphasis on blueprint reading and the use of hand tools. Each of the Services prefers to have young men with a well-

Members of the Industrial Arts Policies and Planning Committee

Seated, from left to right are: John Ludington, specialist in industrial arts, U. S. Office of Education; Verne L. Pickens, chairman, division of practical arts and vocational education, Kansas City; Roy Fales, vice-president of the AVA for industrial arts, and chief of the Bureau of Industrial Arts Education, State Education Department, Albany, N. Y.; Shriver L. Coover, chairman of the committee and director of the industrial arts department, State Teachers College, California, Pa.; M. D. Mobley, AVA executive secretary, Chris H. Groneman, head, industrial education department, Texas A. & M. College; and Stanley J. Pawelek, supervisor of industrial education, Baltimore, Md.

rounded general background of high school education in these areas so that their education will be adaptable to the special requirements of the armed forces. It was indicated that a bulletin would appear in the summer of 1951 which will be available to educators on an analysis of educational programs.

Problems relating to membership in the AVA of any group of industrial-arts teachers were fully discussed with the executive-secretary. He emphasized the fact that affiliation with the AVA may be consummated at any time by a letter of application from the duly elected officers of any group of teachers or teachers and students, and the submission of a copy of their constitution and bylaws.

In the discussion relative to the AVA convention in Minneapolis, the committee unanimously agreed that Dr. Homer J. Smith be asked to serve as program chairman, and that William C. Krause, president of the Minnesota Industrial Arts Association be appointed cochairman to assist him.

THE SCHOOL SHOP MARKET DURING THE EMERGENCY

F. C. FINSTERBACH
Educational Director
Walker-Turner Division
Kearney and Trecker Corp.
Plainfield, N. J.

In times like the present when shortages occur in many supply items, when defense orders increasingly take precedence, when restrictions of one kind or another handicap ordinary business procedure, the schools are often left at the end of the line as far as power tool equipment is concerned.

Knowing these difficulties many dealers stop the efforts they have been making to sell the schools and place their emphasis elsewhere. This we feel is a shortsighted policy and accordingly urge every dealer and salesman not to drop their school accounts entirely but to maintain contact and to strive in every way to give product service, furnish parts, give out literature, etc., to let the school people know that we have their interest at heart even though we may not be able to furnish machines as fast as heretofore.

It is natural and ordinarily good business procedure to push those accounts which will bring in the quickest results but with the schools the situation is somewhat different — they are in no way to blame for the present difficulties but too often, they are forced to carry a disproportionate share of the neglect which results.

We say this with firm conviction: ***The dealer and manufacturer who does not forget the school market entirely during times of stress is the one who cashes in on the good will when things return to normal.***

To this end, Walker-Turner as a Power Tool Manufacturer pledges that school needs will be met as long as humanly possible under the present system and that every effort will be made to furnish parts and educational services to the schools in order to preserve existing resources as long as we possibly can.

Where Emphasis May Be Placed

If experience of the past war is repeated many of the school shops will be converted to defense training. This is especially true of the full-time vocational schools, the technical high schools, two-year technical institutes, and some teachers colleges. In some cases, notably in the senior high school industrial-arts shops of small towns and in agriculture shops, the training will also be converted to defense.

In these cases the school shops affected will undoubtedly carry a fairly high priority as they did in the past and may be served as readily as comparable industrial accounts.

Inquiries and calls made *now* will reveal which schools are contemplating defense training — this is important. In the lower grades and in junior high school industrial arts probably no direct defense training will take place. It is these shops and teachers which suffer the most and it is here where an occasional call, fast part delivery and willing service really pays off in good will.

Some of our educational services now available for schools are as follows: school shop planning service — free; student plan sheets — small charge; use of the grinder — free; use of the band saw — free; use of the drill press — free.

Other sheets on use of W-T machines are in process and will be sent to dealers as published.

W-T will continue to carry advertising in the INDUSTRIAL ARTS AND VOCATIONAL EDUCATION magazine, the *School Executive* magazine, *School Shop* magazine, and will continue a booth in the American Industrial Arts Association and the American Vocational Association annual conventions. Dealer participation in local and state educational shows will also be encouraged.

Machine bases. (Oil signs and barber-chair base.)
— Submitted by Stan Schirmacher, Cottonwood, Ariz.

DEMONSTRATION PANEL

WILLETTE M. RILEY
Cleveland, Ohio

A revolving circular panel, such as the one described and illustrated in this article, serves as an excellent visual aid exhibit on which completed pieces of work can be shown. It provides an orderly display for visitors who may wish to get an idea of the work performed in the department.

This circular display panel is of special convenience since it conserves space which is of major importance in most classrooms. This panel provides a space 6 by 12 ft., and covers only 4 sq. ft. of floor space. The panel is portable, and may be kept out of the way when not in use.

The panel may be cheaply constructed. This one is of sheet aluminum, but other light materials such as plywood or masonite also may be used. The cylinder is supported by 1-in. pipe, and revolves on a ball-bearing race. The materials can be obtained from electrical and plumbing shops, and the ball-

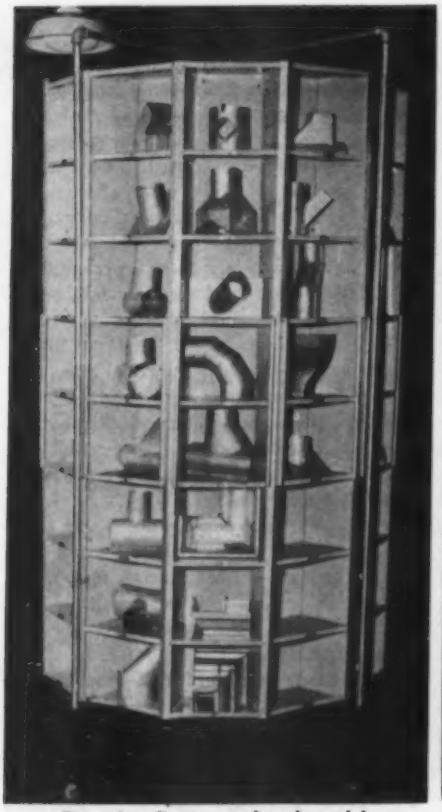


Fig. 4. Patterns developed by parallel line developments

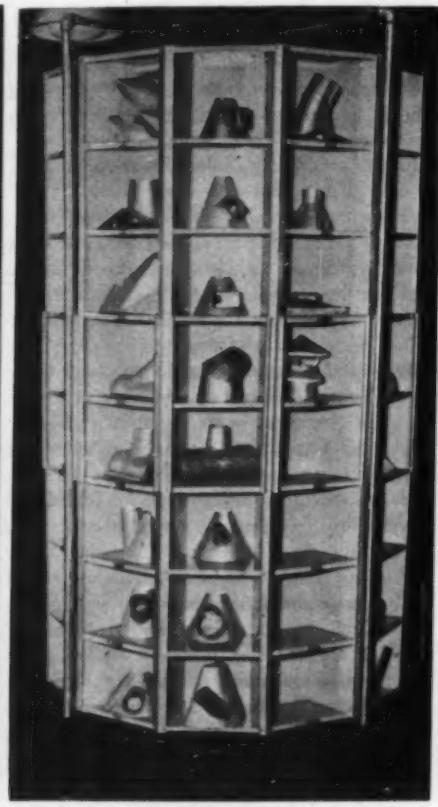


Fig. 5. Radial line developments

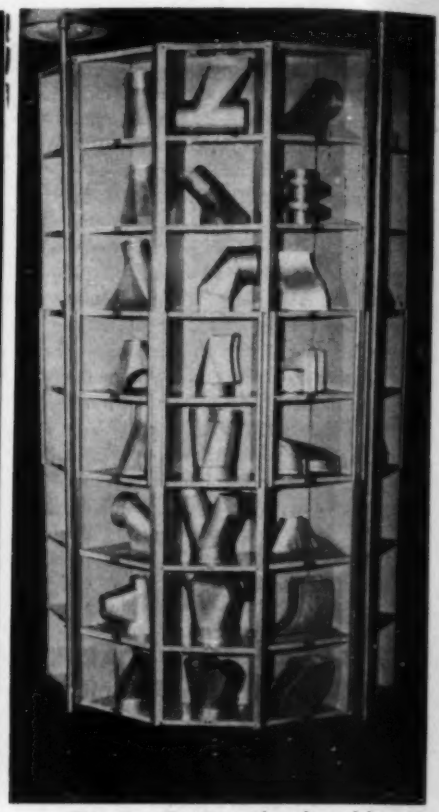


Fig. 6. Patterns developed by triangulation

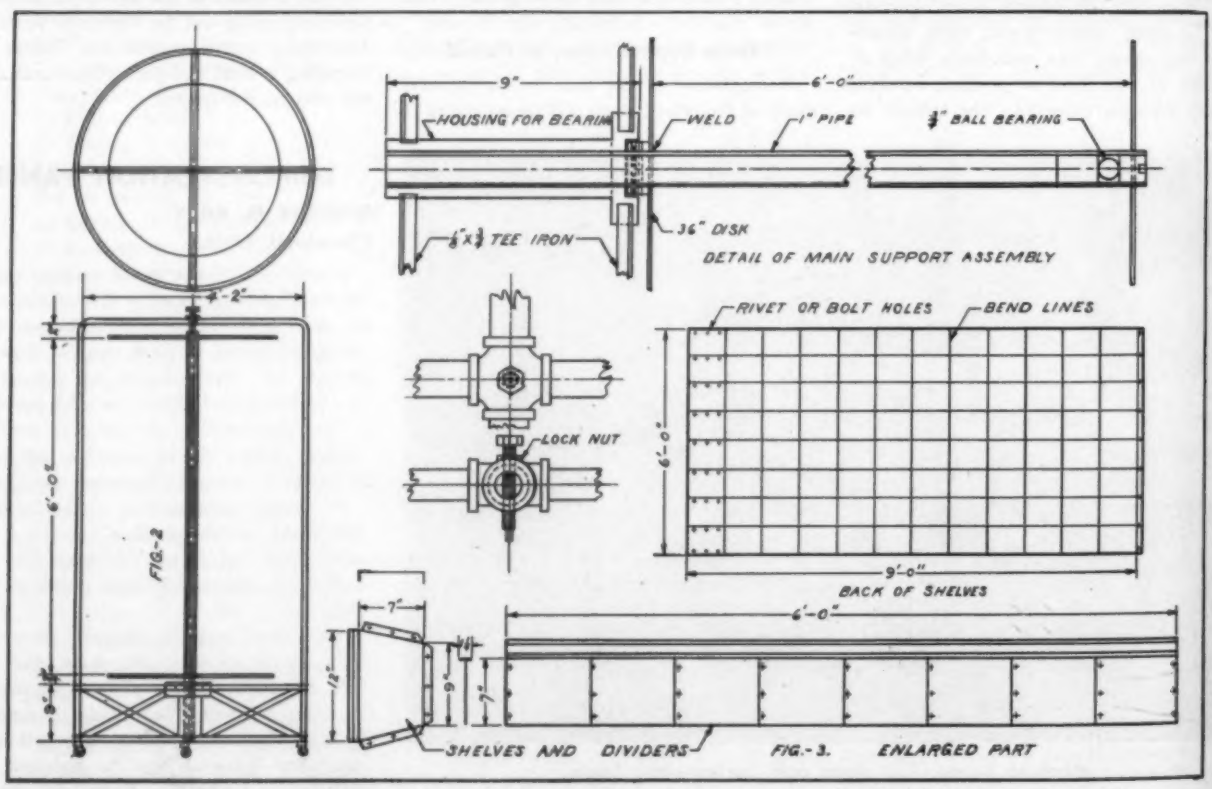


Fig. 2. The frame and base support without the drum. Fig. 3. The details of the separate parts

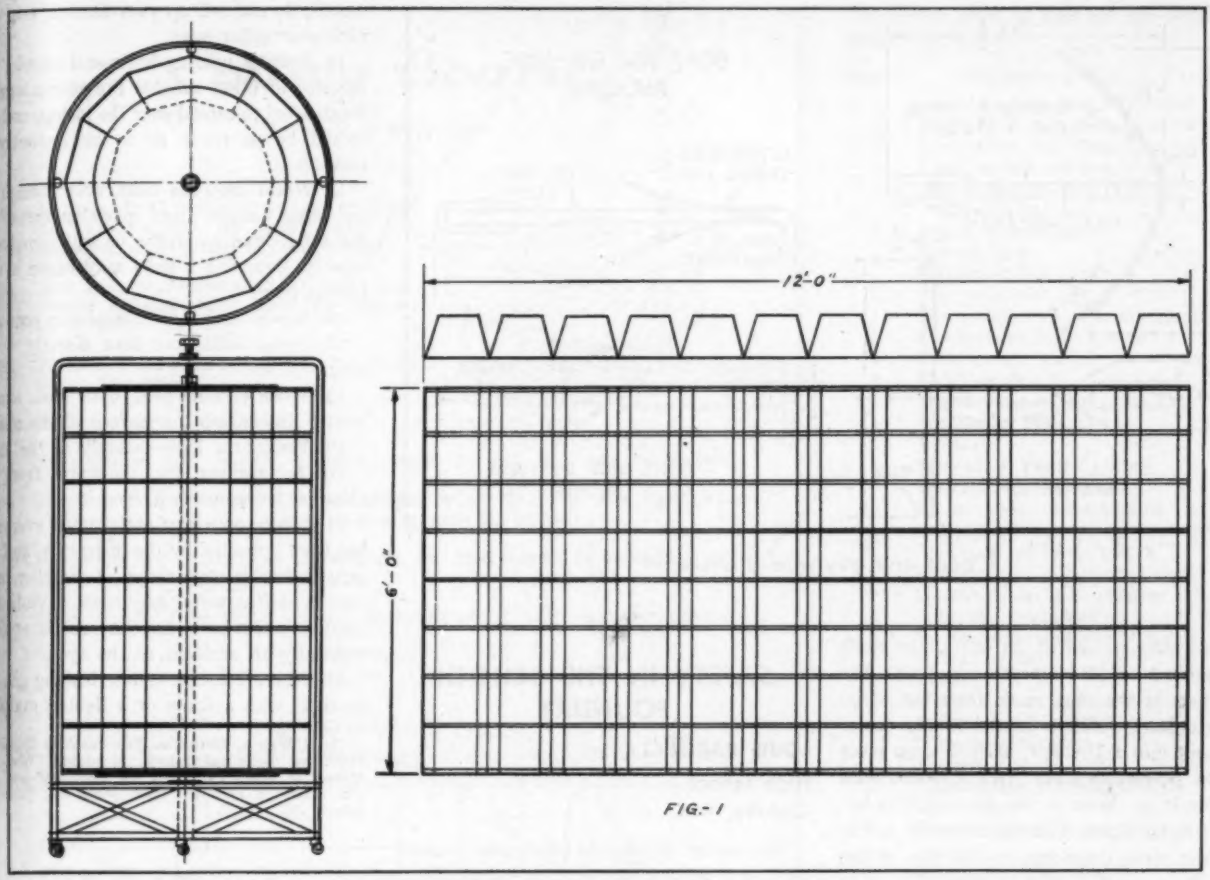


Fig. 1. The plan and elevation of the assembled panel, and the flat display panel

bearing housing may be made in any machine shop. The frame is constructed of ⅛ by ¾-in. channel iron, ⅛ by ¾-in. T-iron, and ⅛ by ½-in. band iron. The vertical pieces are ⅛ by 1½-in. channel iron.

The necessary materials include:

No. of pcs.	*Name*	*Size*
	Sheet of metal or other light material for the drum	
1	Ball-bearing race (thrust bearing)	
1	Pipe	1 in. by 7 ft. 6 in.
4	Galvanized iron pipe or conduit	½ in. by 7 ft. 6-in.
4	Galvanized iron pipe or conduit	½ in. by 2 ft.
4	Galvanized iron elbows	½ in.
1	Galvanized iron cross	½ in.
2	Disks	⅛ in. x 16 ga. to ⅛-in. thick sheet steel
2	Channel iron	⅛ x ¾ x 13 ft.
8	T iron	⅛ x ¾ x 2 ft.
8	Band iron	⅛ x ½ in. x 2 ft.
4	Channel iron	⅛ x 1½ x 9 in.
4	Creeper casters	

Almost all of the work required to make the display panel was done by apprentice sheet-metal workers. The instructor merely designed and supervised the project. Using the following plans and inexpensive materials, the revolving display panel can be constructed for various display purposes.

BOAT AND GUY-WIRE ANCHORS

FRANK M. BUTRICK, JR.
Alma, Mich.

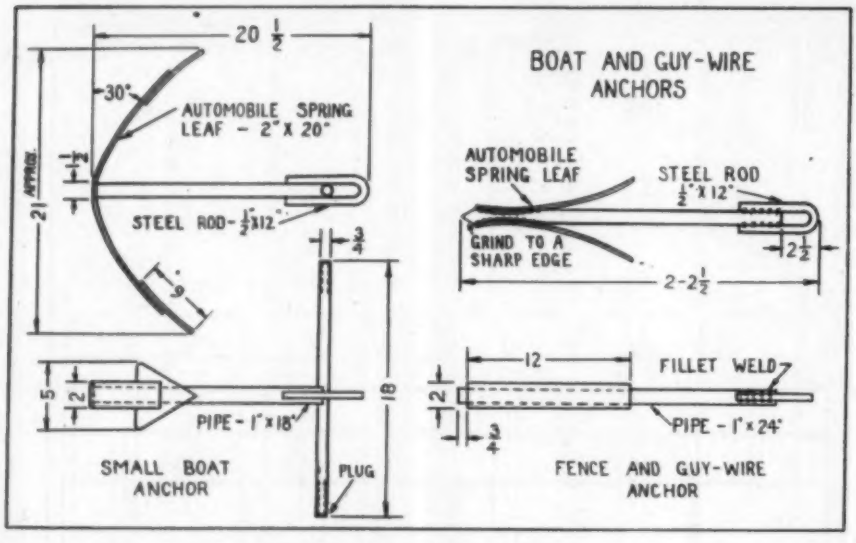
The small boat anchor described in this article is a fine project for a welding class. Most students will be interested in the boat anchor, and the more serious-minded individuals will probably be interested in the fence or guy-wire anchor. Both are easily and quickly made, and inexpensive materials are required.

Boat Anchor

This is a simple arc welding project which the average student should be able to complete in a few hours. The dimensions given may be altered for varying sizes of boats, and the flukes may be omitted entirely if the bottom of the lake or river where it will be used is heavy gravel or clay, or covered with trash.

The following materials are required: 1 automobile spring leaf: 2 in. wide by 20 in. long; 1 shank: 1-in. pipe by 18 in. long; 1 ring: ½-in. diameter steel rod by 12 in. long; 1 stock: ¾-in. pipe, by 18 in. long.

First, heat the middle of the spring until it is cherry red and then bend each end approximately 30 degrees leaving a 1½-in. flat in the center. After the leaf has cooled enough to handle it, weld one end of the shank which consists of 1-in. pipe, to the center of the arms. Be certain that this is square. Run a bead of fillet weld around the shank, and measure from the center of it to the end of each arm. If they are unequal, reheat the leaf and bend it until the arms are at equal angles from the shank. At the upper end of the shank, cut a U notch on each side, so that the piece of ¾-in. pipe may be welded on at a 90-degree angle to the arms. Carefully square this both with the arms, and with the shank, and weld securely. Plugs for the ends of this stock should either be small pipe caps or a small circular piece



Boat and guy-wire anchors

of steel plate welded to the end of the stock and ground or filed smooth and flush. The next part is the ring, made from the ½-in. diameter rod, which is heated in the center and bent into a U shape, using a scrap piece of 1-in. pipe as an arbor. This is welded onto the shanks as shown in the drawing. The last parts are the flukes. Cut them from ⅛ or 3/16-in. sheet steel, depending on the size of the boat. They are triangular in shape, 5 in. wide and 6 in. high, with the two corners rounded. Space them on the ends of the arms as shown, with about 3 in. of the point protruding from the end of the arm, and weld securely. Remove the scale, and grind all edges smooth. A protective undercoat of aluminum paint and two finish coats complete the job.

Fence or Guy-Wire Anchor

This is constructed in a manner very similar to the boat anchor just described.

The following materials are required: 2 automobile spring leaves, 2 in. wide by 12 in. long; 1 shank: 1-in. pipe, 24 in. long; 1 ring: ½-in. diameter steel rod by 12 in. long.

Flatten one end of the pipe for about 1½ in. in a vise or with a hammer. It may be necessary to heat the pipe to allow it to flatten without cracking. Weld the spring leaves opposite each other on the flattened end of the shank, filling in the cracks securely with the fillet weld. At the opposite end of the shank weld the ring. Just bend the ½-in. steel rod in a *U* shape, using a piece of 1-in. pipe as an arbor. The end with the spring leaves is then ground to an edge, as shown in the drawing, to facilitate driving into the ground. Apply two coats of aluminum paint to rustproof the anchor.

SAFETY IN THE SCHOOL FOUNDRY

LOUIS BAROCCI
High School
Cudahy, Wis.

The number of schools which offer foundry work as a definite part of their industrial-arts program is small. Nevertheless, safety rules governing work in this shop should be considered very carefully.

If the shop is to function with a minimum amount of accidents, the foundry student and the teacher must be constantly alert to the following rules and regulations:

1. Keep the shop floors free of rubbish, and be sure that flasks are in good condition.
2. Set the molds in a line so that the person pouring will not trip or stumble over a mold.
3. Keep sand well tempered.
4. Do not ram molds too tight.
5. Be sure that molds and cores have been properly vented.
6. Have ladles well lined and hot.
7. When ladle is not in use, set it aside.
8. Continue adding binder to the sand.
9. The instructor should furnish a respirator when one is needed. Wear it according to instructions.
10. After handling lead in any form, wash your hands carefully before you eat or before you place anything in your mouth.
11. When working with gloves, do not place them against your face. They may have come in contact with some harmful material.
12. Unless you understand the instructions, do not attempt to light a burner.
13. When working with or around hot metals, do not roll up your sleeves, nor work with your collar open.
14. Persons pouring hot metal should wear asbestos or other suitable protective leggings, constructed to extend over the instep, and they should be so made as to be instantly removable.
15. Never drop the ladle, even though you are being burned, from splashing metal. Lay the ladle down carefully, or call someone to take it. Dropping a ladle may cause a more serious burn.
16. Never carry molten iron over cement.
17. Never hold your face directly over a riser.
18. When pouring pegs, have loose sand at least 6 in. beneath the surface of the mold.
19. Fasten the ladle securely in the shank.
20. To remove the moisture from the skimmer before using it, heat it.
21. Never pour any metal until everything has been inspected by the instructor, and then only under his supervision. Remember, moisture in molten metal may cause a violent explosion, which may cause a serious accident, especially an accident to the eyes.
22. Never attempt to test leaking gas connections with a flame or a lighted match.[1]

[1]David Watson, Instructor, Patternmaking Department, Manitowoc Vocational School, Manitowoc, Wis., 1938. *Manual of Safety Instruction for Vocational and Industrial Arts*, The Fine Arts Press, Santa Ana Senior High School, 1937, p. 37.

CUTTING BOARD

HAROLD O. AKESON
East Orange, N. J.

This cutting board, made in the shape of a fish, is an interesting version of a necessary kitchen need. It is easier to grasp than those that are square or round. A hole may be drilled through the tail if the board is to hang on a wall.

It is not necessary, or practical, to paint the surface but the edges could be painted to match the kitchen color scheme, if the pupil so wishes. Painting oftentimes causes complications with the lower grade students.

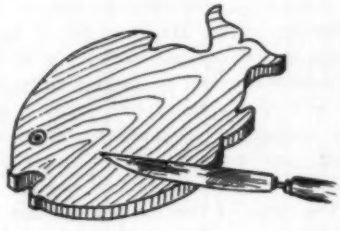
This particular subject is especially good for the elementary grades, giving some old and some new information, especially that of working in hard woods. Assistance, such as machine planing and sawing stock for the pupils, is furnished by the instructor. When the job is completed it should make a practical gift to take home.

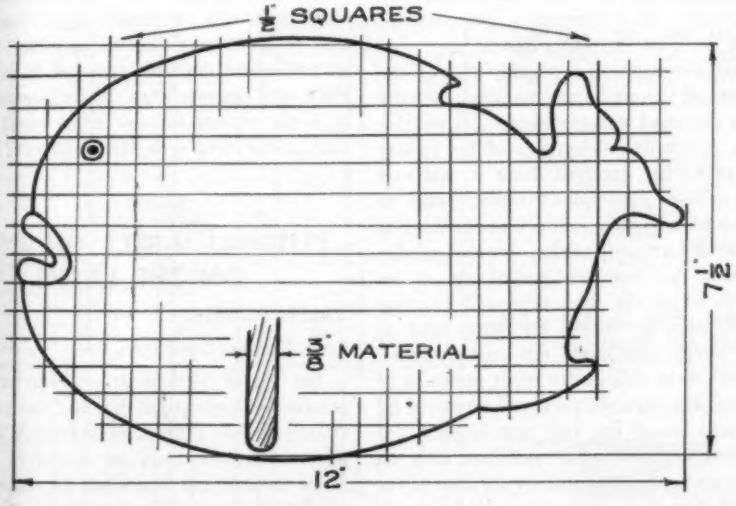
Disabled veterans on Veterans Administration compensation and pension rolls on July 31, 1950, included 15 who served in the Civil War; 460, Indian War; 91,541, Spanish-American War; 525,045, World War I; 54,270, Regular Establishment; and 1,671,745, World War II.

Cutting Board

BY
HAROLD O. AKESON

1. Make a full size drawing of fish on large sheet of paper. Use 1" squares for drawing the shape.
2. For a hard, substantial cutting board select such wood as maple or birch.
3. Transfer the drawing of the fish onto the board.
4. Cut out with band saw.
5. Spokeshave all edges. Places, hard to get at, may be filed.
6. Sandpaper both surfaces and edges with No. 1 grade sandpaper. Follow with No. $\frac{1}{2}$ or No. 0 for a smooth effect.
7. No paint or finish is necessary as the board is usually subject to washing after using.
8. An eye could be made with a few turns of a $\frac{3}{8}$" plug-cutter.





HAND TOOLS FOR HOUSEHOLD EXIGENCIES

WILLIAM A. BAKAMIS
Graduate Student
Bradley University
Peoria, Ill.

The ability of future homeowners to meet and cope with the many household exigencies is a problem that many industrial-arts instructors are trying to solve through the introduction of home-mechanics courses. These courses are offered to boys and girls and try to develop in each pupil handy-man skills in using common hand tools. Students enrolled in home mechanics learn to make their own home repairs. By doing this they not only save money, but they have that enviable feeling of accomplishment that comes with a job well done. These students are interested in the tools required for making everyday household repairs. They also want to know the type, size, and cost of each tool.

An analysis of hand tools that are useful for making these household repairs was made by a group of students enrolled in a home-mechanics class at the State College of Washington. The following list of tools was found to be adequate for the average householder to do ordinary repair jobs around the home. The prices given in this list are subject to change, of course.

Number	*Description of Tool*	*Total Cost*
1	Jack plane, 14 in. long, 2-in. cutter	$8.25
1	Screw driver, 8-in. blade, $\frac{3}{8}$-in. bar	.90
1	Screw driver, 4-in. blade, $\frac{1}{4}$-in. bar	.70
1	Hammer, claw, bell face, 15-oz.	2.35
1	Square, framing, body 24 by 2 in., tongue 16 by 1½ in.	3.20
1	Square, combination	2.10
1	Nail set, $\frac{1}{16}$ in.	.20
1	Monkey wrench, 15 in.	1.90
1	Crescent wrench, 8 in.	.98
1	Pipe wrench, 14 in., 3-in. jaw opening	2.25
1	Saw, crosscut, 26 in., 8 point	3.75
1	Chisel, socket, $\frac{1}{4}$ in.	1.25
1	Chisel, socket, 1 in.	1.42
1	Paint brush, 3-in. flat	4.50
1	Paint brush, 1½-in. sash	1.32
1	Jackknife	1.25
1	Putty knife	.63
1	Hack saw, adjustable, with 1 doz. 10-in., 24-tooth blades	1.60
1	Cold chisel, $\frac{3}{4}$ in.	.67
1	Rule, push-pull type, 72-in.	1.25
1	Hatchet	2.50
1	Mason's trowel, 5-in. pointing	.83
1	Brace, bit, 10-in. sweep	4.80
1	Set bits, auger, sizes (Nos. 4, 6, 8, 10, 12, 14, 16)	11.70
1	Gimlet	.35
1	Wood file, 12-in. half round	1.27
1	Mill file, double cut, 10 in.	.56
1	"Plumber's Friend"	1.25
1	Tin snips, 3-in. cut	3.40
1	Soldering iron, 110-volt, $\frac{7}{8}$-in. tip	7.25
1	Glass cutter	.29
1	Galvanized water bucket, 10 quart	1.00
1	Funnel	1.25
1	Pliers, combination, 8 in.	.67
1	Oiler, ⅓ pt., 4-in. straight	.42
1	Flashlight	1.67
1	Countersink	.63

The following tools are useful, but are not used as often as those in the foregoing list.

2	*C* clamps, 4 by $2\frac{1}{16}$ in. @ $1.23	$2.46
1	Ripsaw, 26 in., 5½ pt.	3.75
1	Bench vise, 3-in. jaws	4.66
1	Wrecking bar, $\frac{3}{4}$ by 30 in.	1.08
1	Washtub, small	3.35
1	Cement trowel, 12 in.	2.93
1	Level, 24 in.	2.75
1	Blowtorch, gasoline, 1-quart capacity	8.40

Homeownership can be considered a business. It requires a continuous outlay of capital in order to earn the dividends of contentment for the owner and his family. The outlay for hand tools is of paramount importance for the future homeowners. They should be instructed to *buy only the best tools*. Good tools, well chosen and well kept will last a lifetime. Avoid buying poor tools or those that are just *good enough to start with*. It is better to do with fewer tools than to buy poor ones and regret it later. Tools, well chosen will almost invariably produce better results, last longer, keep sharp longer. The investors of repair funds should know how the money is to be spent and for what. The foregoing list may be useful in helping them to make their selection of proper equipment.

ASSIGNMENT SHEETS IN RELATED SUBJECTS CLASSES

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William and Mary and VPI
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The use of assignments in the study of related subjects in vocational schools is becoming, increasingly, a matter for study and discussion. The need for that type of instruction has long been felt by some educators, who saw in the assignment method, a means to an end when those being taught had varying educational backgrounds. The recent experience with veterans taking advantage of the educational features of the G.I. bill pointed directly to the necessity for study by assignments. In one group of 25, three had not advanced beyond the sixth grade, one had been graduated from high school, and the majority of the remainder had not gotten as far as high school. Under those conditions it was manifestly impossible to find a textbook from which lessons could be assigned, and which would insure uniform progress on the part of all the students.

At the Technical Institute students taking certain courses are required to begin mathematics at the lowest level, that is, multiplication, division, fractions, etc. The course takes the student through the subject of mensuration of solids and is divided into 28 assignments.

Each assignment contains the instruction necessary for ready understanding on the part of the student, and a sufficient number of problems to enable him to gain a thorough comprehension of the principles involved in that particular assignment, and finally a series of written problems embodying the same principles.

The assignments in mathematics consist of the following: fractions, decimal fractions, percentage, ratio, proportion, average squares and square root, application of square root, areas of isosceles triangles, areas of scalene triangles, angles in triangles and their measurement, use of constants, area of trapezoids, areas of composite figures, circumference, areas of circles, diameters of circles, areas of ring sections, circles and comparative figures, cube root, volume of prisms, pyramids and cones, measurement of lateral surfaces of frustums, spheres, and volume of composite solid figures.

When the class assembles the instructor delivers an introductory talk during which the range of the subject and the manner of attack is clearly outlined. Then the first assignments are distributed and the students begin to work, individually, feeling free to come to the instructor's desk for the clarification of such points as may not be clear to them. A line is carefully drawn between rendering assistance where needed and actually doing the work of the assignment for students who might be indolent.

A record is maintained in the classroom and on it is listed each student's name and in accompanying columns are entered the assignments as they are completed. It has been found that this visual incentive is of benefit to those who might be tempted to lag behind in their work. During one quarter's session, the average of assignments completed was eight, and only two of a class of 25 had failed to measure up to that average.

The value of this method lies also in the thoroughness of the instruction, for each problem, upon completion of an assignment, is carefully checked, and those found to be incorrect are analyzed for the student by the instructor. It had been found, previous to the introduction of assignments, that those who were less fortunate in their earlier educational advantages, or those who had received them too far in the past, were greatly handicapped, since they soon became bogged down in a mire of ignorance and confusion; they became discouraged and not only failed to make progress in mathematics, but acquired distaste for other related subjects.

A poll was instituted recently among the members of a mathematics class and the opinion expressed was unanimous that instruction by assignment sheets was of far greater value than that received from a textbook earlier in their educational careers. Some of the reasons advanced were: The instruction, being of a personal nature, was of greater value than that received by class instruction. Those to whom the work presented no great problem were not bored by being kept at lessons which were easily mastered by them, but which were difficult for other members of the class. The opposite view was expressed by those who found the task not so easy, for they were able to spend sufficient time on each assignment and so prepare themselves for the next step.

Another advantage of the assignment system is that it permits a student who registers after the regular registration has been closed, to enter a class where the work is well under way. If the assignment sheets are carried on into algebra, further advantage is obtained, for one instructor can preside over a group including both those who are studying beginning mathematics and those studying algebra.

One factor cited against the assignment system is that it makes it impossible to establish standards of attainment. This is a valid objection. However, with the use of a textbook not all who are members of the class achieve the necessary standard and are promoted to the next class. Those who failed might have been able to master at least a portion of the textbook thoroughly, if they had not been compelled to keep step with the rest of the class, but had been permitted to make slower and more thorough progress. It is not helpful to the students who fail to inform them that some of his classmates had passed and he should have passed, also.

It is more valuable, not only in instruction itself, but in the unfolding of the student's character that as few failures as possible be registered against him. It is better to complete three fourths of a course thoroughly and have the student realize that he has done well, than to have him muddle through the entire course and have but a hazy idea of what it is all about.

It is realized, of course, that if the work being done must result in a credit for a higher institution of learning, it is necessary that standards of attainment be established. However, in vocational schools, generally, such advancement is not anticipated.

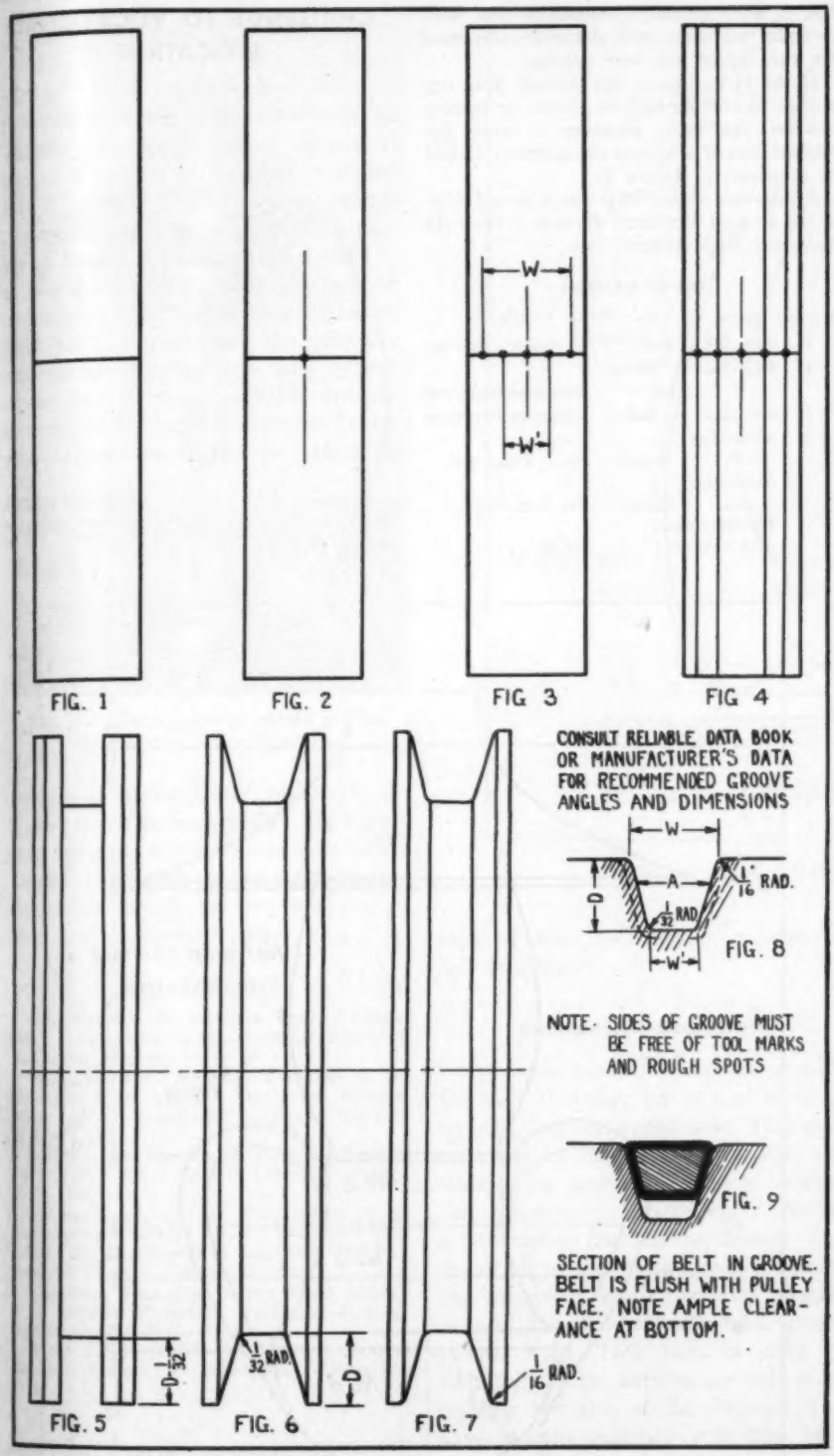
It is tremendously stimulating to instruct a class in which the assignment method is in use and to observe the interest with which the students, many no longer young, attack each assignment and hand in the completed work with a feeling of having done something worth while. To completely absorb the attention of a 30-year G.I. in problems dealing with fractions, decimals, etc., and to have him smile with pleasure when the problem is solved is ample reward for any effort spent in arranging the details of the assignment sheets.

CUTTING V-BELT GROOVES ON THE LATHE

RALPH POPKIN
Paso Robles, Calif.

The use of V belts in an ever increasing number of applications has had the effect of classifying the process of cutting V grooves into a complete operation similar to cutting screw threads and tapers on the engine lathe or cutting gears and key seats on the milling machine. Thus, as in these other processes, standard techniques should be developed for cutting V grooves to suit the various applications and specific problems.

The following procedure has been established on the basis of longtime use and observation. The suggested method of layout can be applied in practically every situation involving single or multiple groove pulleys. As for cutting the V grooves, there are a number of factors that may determine the specific steps. For instance, the tapered sides of the groove may be cut with a form tool or with the compound rest. Usually, when the diameter of the pulley is as large or nearly as large as the swing of the lathe, the compound rest may be more efficient because



Cutting V-belt grooves on the lathe

of the loads and stresses involved. If the pulley is of a light, cast construction, a form tool may produce *chatter*. However, if those conditions do not apply, the form tool method is generally more efficient and will produce a smooth job in a shorter time, especilly for cast iron, brass, and aluminum pulleys.

When cutting V grooves in cast pulleys of thin cross-sectional area, particular care should be taken in centering the groove on the rim and in cutting smooth radii at the bottom of the groove. This precaution will decrease the possibility of having a section of the rim break off. It is important also that there be radii at the top of each groove to prevent excessive belt wear, as shown in Figure 8.

It is suggested that a set of form tools be ground to shape at the first time the need arises and that the tools be marked and stored for future use. Gauges also should be made for checking tool shape, groove shape, and for setting tools. For cutting the smaller size V grooves, the tapers for cutting both sides of a V groove can be ground on one end of a tool bit; for the larger sizes, a right and left hand tool will be required.

Layout tools and equipment: layout fluid, scriber, 6-in. scale, prick punch, hammer, small dividers, lathe tool bit ground to a sharp V (to mark lines across and around pulley face), combination depth gauge and protractor.

Steps in Cutting V Grooves

1. Turn pulley face and edges. Finish turn and polish.

2. Apply layout fluid across the pully face in a strip ½-in. wide.

3. Scribe a line across the pulley face by locking the spindle and using the tool bit scriber. Figure 1.

4. Locate the center of the pulley face along the scribed line and prick punch it lightly. Figure 2.

5. From the center, lay out the centers of the grooves with the dividers. Prick punch centers. This step applies to multiple groove pulleys only.

6. Set the dividers to ½ the width of the bottom of the groove. From the center mark, scribe two arcs indicating the total width of the bottom of the groove. Repeat for width of top of groove. Prick punch. Figure 3.

7. Scribe lines around the pulley face, centering on the prick-punch lines. CAUTION. Stop the lathe and locate the scriber carefully at each mark. Figure 4.

8. Using a cutoff tool, cut a groove on the inner side of each line which locates the bottom width. These grooves are cut to a depth of 1/32-in. less than the full depth of the V groove. Remove all stock between the grooves just turned. Figure 5.

9. Cut the sides of the grooves with the form tool. Cut all left sides, then all the right sides. Turn the bottoms of the grooves to proper depth and form the radii at the bottoms. Figure 6.

10. Check top widths, angles, and depths.

11. File the top radii. Smooth and polish the sides of the V grooves. Figure 7.

TWO SPUN METAL LAMPS

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The lamp illustrated in Figure No. 1 is a reproduction of an old fashioned oil lamp with sufficient variations in size and design to improve it as a table lamp. It was made of copper but may be spun of aluminum or brass equally well.

Good spinning practice will enable the student to reproduce this lamp without difficulty as the chucks are easily spun over. Use the exact dimensions shown in Figure 2 to construct chucks numbered one to five. The hole in the shade should be cut while spinning on the lathe at the point specified on the drawing.

One of the lamps made from this design won a first prize in the wrought aluminum division of the 1949 National Industrial Arts Award Fair at Chicago.

BILL OF MATERIAL

Number	*Name*	*Part*	*Size*
1	8-in. disk	Shade	20-gauge
1	8-in. disk	Bottom	20-gauge
2	6-in. disk	Body	20-gauge
1	5-in. disk	Chimney holder	20-gauge
2	Tubing		5/16 x 8-in.
1	Threaded pipe		1/8 x 5 in.
1	Lamp chimney		No. 1

The lamp illustrated in Figure 3 is constructed with three chucks, No. 1, 2, and 3. Following these dimensions when making the chucks will result in the proper fit of a No. 1 lamp chimney. Aluminum was used to make this lamp, with aluminum wire used for the handle and wire guards.

If the 1/8-in. pipe is run through from top to base, the fixture may be put on top making a novel table lamp. However, to retain the original idea of a lantern the assembly should be as shown in Figure 3.

A variation of this lamp won a second prize in the wrought aluminum division at the 1949 Industrial Arts Awards Fair.

BILL OF MATERIAL

Number	*Name*	*Part*	*Size*
1	6-in. disk	Base	20-gauge aluminum
1	5-in. disk	Chimney top	20-gauge aluminum
1	6-in. disk	Holder	20-gauge aluminum
4	Aluminum wire	Guards	No. 8-ga. 8-in.
1	Aluminum wire	Handle	No. 8-ga. 4½-in.
	Threaded pipe with locknuts		1/8-in.

Fig. 1

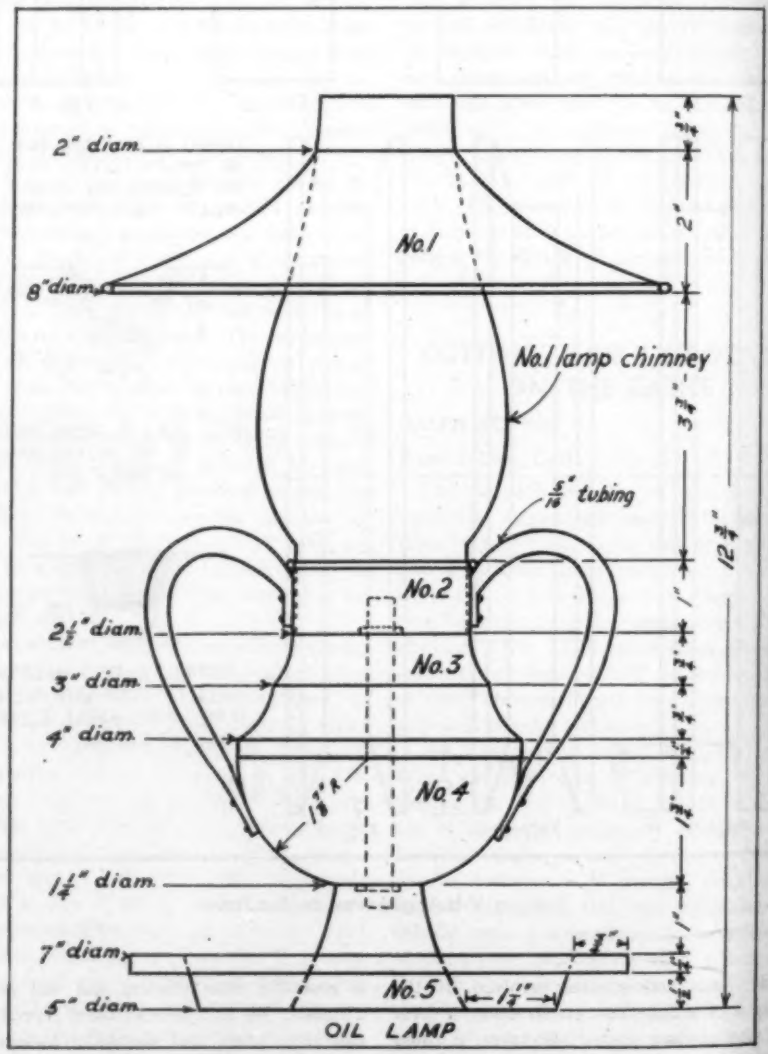

Fig. 2. Details of electrified oil lamp

CHALLENGE TO VOCATIONAL EDUCATION

(Concluded from page 179)

to future students of the institution."[4] It is doubtful if any one activity will contribute so much to the revision of an educational program as careful study of what happens to its graduates and dropouts.

These are the challenges faced by our vocational leaders, and they cannot be solved by them alone. They need the cooperation and best thoughts of the school faculty, labor, management, and the community. Shall we, as vocational people, spread ourselves so thinly in trying to do a blanket job? Must we remain in the

[4]Hoppock, R., and Tuloff, N., "Vocational Guidance," pp. 96–101, *Vocational Education*, National Society for the Study of Education, Forty-Second Yearbook, The Department of Education, The University of Chicago.

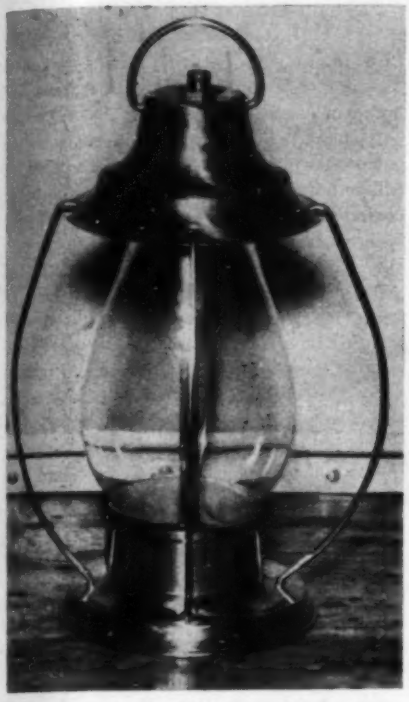

Fig. 3. Electric lamp made in the form of an old oil lantern

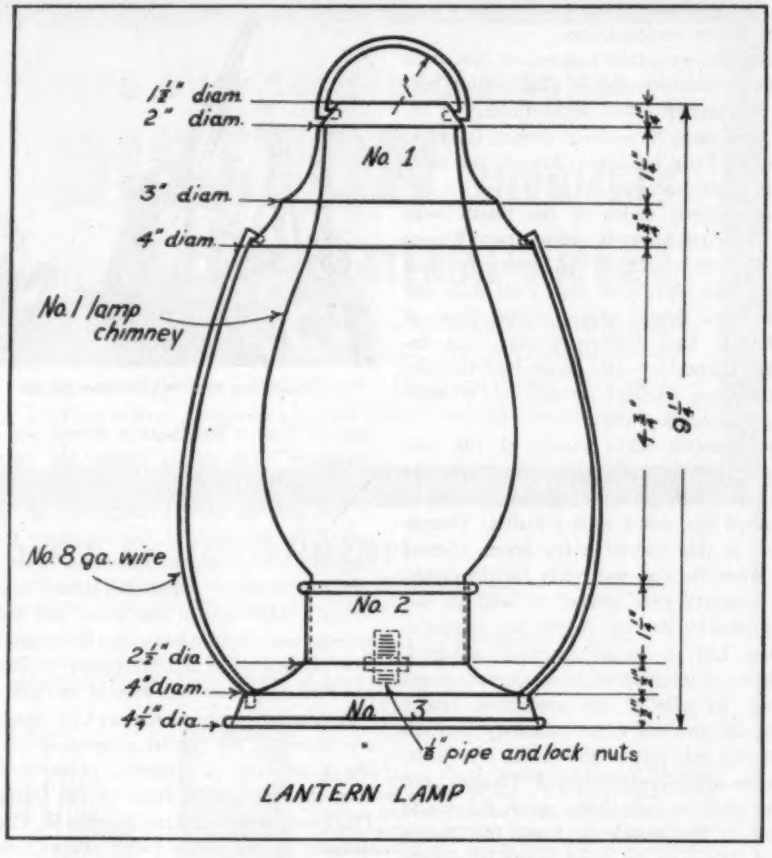

Fig. 4. Details of lantern lamp

educational background, and accept administrators from other fields? The answer is an unequivocal No! Let us not lose our identity, let us abide by the Smith-Hughes Act, and do the job that we can do best — specialized vocational training.

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MUSEUM WORKSHOP

(Concluded from page 191)

Shakespearean theater which is used for school classroom work.

The various storage files and cases for these traveling displays are all made in the maintenance department. They are also kept in good working condition and are repaired when necessary by members of this department.

Maintenance Department

The maintenance department employs two men. It is their job to keep all of the museum displays in good order. They make the cases for the traveling displays, they make all the necessary repairs to buildings and changes in arrangement of displays on the various floors of the museum. They install all of the major displays, building the framework and casement enclosures, picture frames, and all-round general cabinet work. They keep in order the furniture and the fixtures, not only of the building but also of the displays. They have a shop equipped with two 24-in. scroll saws, a 12-in. lathe, a bench model spindle shaper, and a 36-in. band saw.

* * *

Cryolite, a solvent used in the electrolytic production of aluminum, also is used as an insecticide in warding off hornworms from certain types of tobacco.

A HUGE JOB IN CERAMICS

HELEN JO CRISSMAN
News Bureau
The University of Kansas City
Kansas City, Mo.

Heroic masks of comedy and tragedy, said to be the largest ceramics pieces ever fired in this country, have recently been completed for the University of Kansas City Playhouse. Comedy weighs 860 pounds, Tragedy, 700 pounds. Each mask is 5 ft. wide, 4 deep, and 3 high.

The sculptured figures, two years in the making, are the work of Thomas R. Thomas, University of Kansas City art instructor, and Walter C. Millson, vice-president of the W. S. Dickey Clay Manufacturing Company of Pittsburgh, Kans., in whose kilns the gigantic pieces were fired.

Thomas' first job was to design small models of the masks. With the models completed, the artist, assisted by two students, built an armature or framework of wood, over which they fitted wooden laths, chicken wire, and layers of excelsior dipped in plaster of Paris. Contours of the features were roughed in with the fast drying, pliable excelsior and plaster.

Over this was molded the final features with a layer of fine modeling clay.

The masks were then mapped off into areas to avoid undercuts and to allow easier handling. A plaster mold, approximately 4 in. thick, was taken in sections. Several layers of plaster of Paris bandaged through the mold gave it tensile strength.

The sectional molds of the masks were taken to Pittsburg, 130 miles from Kansas City, Mo., and assembled. A mixture of buff and red clays, developed from local shale and gumbo clays closely approximating those of the Kansas City University area, was developed. Laboratory tests determined the possible shrinkage, warpage, porosity, and strength of the completed product.

Approximately 1000 pounds of the clay mix was used in each mask. This clay was stiffer than average ceramics clay. It had to be worked into place with a mallet. Thomas worked at this operation for seven 10-hour days. When the clay was ready for the molds, wood supports were erected to hold up the arches made by the clay. As the clay dried, the supports had to be continuously adjusted, sometimes at intervals of 30 minutes, to avoid cracking. In spite of this precaution, cracks did develop and had to be constantly mended.

The clay was left in the molds four days. When the molds were removed, Thomas used a steel drill to bore holes over the inside surface of the masks to assist the drying process. The casts remained in the laboratory for three weeks' drying under normal atmospheric conditions, and then they were hauled to dryers in the plant, where, under rigidly controlled heat and humidity conditions, they were left for six weeks' slow drying.

A salt glaze was decided upon, and one of the company's beehive kilns, 36 ft. in diameter, was commandeered for the firing. Salt, similar to ice cream freezer salt, was poured into the gas fireboxes. At the firing temperature of 2000 degrees, at which the masks were fired, salt vaporizes to form a high glaze. The firing required twelve days, six days of cooking, six of cooling. The relatively thin lips of the masks were broken off previous to firing, and fired as separate pieces. When the kiln door was opened, the finished masks, a rich reddish brown terra-cotta color, had come through without a break.

Tragedy and Comedy were then transported by truck to Kansas City, placed on the fireplace by means of a hoist and tractor, and the lips cemented into place.

Intensifying the brown tones in the Arkansas limestone of the fireplace stonework, the dark glaze catches the high lights effectively. Across the campus, facing the masks, is the university administration building, the former home of W. S. Dickey, who founded the Dickey clay products company in 1885. The Dickey home, a four-story native stone structure of French Renaissance design, was purchased in 1933 shortly before Mr. Dickey's death as the first university building.

Hoisting the mask into place

The present Dickey company, no longer owned by members of the founder's family, employs 310 persons at Pittsburg. Besides the 28 large beehive kilns, the plant has the largest tunnel kiln in the world and uses up to 350 tons of raw clay a day in its products. The present office and laboratory building of the Pittsburg plant was erected in 1948.

At the University of Kansas City employees are shown at the crucial moment of hoisting the giant face of Comedy, ceramics mask, atop the fireplace in front of the University Playhouse. Art Instructor Thomas R. Thomas, designer of the masks (with camera) records the completion of the 2-year project. Jack Garvey (hand on knees) was Thomas' student assistant in executing this piece of ceramics sculpture, believed to be the largest ever fired.

EXTENDING THE LIFE OF THE DRAWING BOARD

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During these times when drafting equipment is so expensive and good drawing boards are so difficult to obtain, it has become the custom in most schools to furnish drawing boards which are used throughout the day by members of the drafting classes. It is easily understood that with such use the boards will soon be filled with dents and scratches even though masking tape is used to fasten the paper to the board.

With such disfigured boards, satisfactory student accomplishment can hardly be expected. The accepted practice has been to resand the surfaces of these boards but it is only a temporary measure since it must be repeated in a comparatively short while. Then, too, this constant sanding reduces the size and useful life of the board.

The author, by using a set of old drawing boards and a method of paneling them, has been able to preserve their usefulness and at the same time add greatly to the efficiency of his room in all teaching phases.

Examine Figure 1 which illustrates the equipment furnished on all pupil benches. It will be noted that a recessed area in the board contains the scale, 30–60 deg., 45 deg., and lettering triangles, as well as a T square. Into this recess is placed a panel which is the property of each pupil and upon which he keeps his paper permanently fastened with masking tape. The two holes on the left hand edge of the board permit the pupil to remove the panel for consultation with the instructor and for storage at the end of the period in his particular drawer. This permits the paper to be permanently fastened to the board, and saves time at the beginning and end of the period because the paper does not have to be mounted and removed for each class period. The drawing on the paper also is more accurate, because, when once aligned, it remains so until finished.

Since these panels are the pupil's own, they are usually free from dust and grime. Another advantage is that the panel is small enough to fit into a drawing portfolio permitting it to be taken home for make-up or supplementary work. Its squared edge permits it to be used as a drawing board at home.

To convert the drawing board for panel use, the following procedure is recommended:

Decide upon the material most suitable for the panel. The author has found that both the ⅛-in. tempered Masonite and the 3/16-in. Upson or Beaver pressed paper board are very satisfactory. The tempered Masonite has a harder surface but very good results can be obtained by shellacking the smooth side of Upson, Beaver, or similar pressed paper board. The 3/16-in. thickness may prove more satisfactory for paneling. The author is using the tempered Masonite in his classroom at present but installed similar equipment using 3/16-in. Upson board at the Fenger High School in Chicago about 16 years ago and it is still being used efficiently.

Next decide upon the size of the panel to be used by each student. Portfolios may be purchased generally which can accommodate a 20½ by 13½-in. panel. This leaves a ¾-in. margin around a 19 by 12 paper which is suitable for fastening the paper to the board with masking tape. This size can be cut with little waste from a 4 by 8-ft. stock size panel which can be purchased at any lumber yard. Figure 2 shows the most economical way to cut this panel so that there is little waste.

Figure 3 shows a 20 by 24-in. drawing board altered to accommodate a 20½ by 13½-in. panel. The strips for holding the panel

(Continued on page 22A)

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IMPROVING THE DRAWING BOARD

(Continued from page 22J)

in place are nailed and glued to the old drawing board in the following manner.

1. Make a master panel, exactly 20½ by 13½ in. in size. Check to make certain that it is perfectly square. Use this master panel in framing all boards so that all will be identical.

2. Cut the following strips shown in Figure 3 from material that is as thick as the panel for each board to be framed:

2 — 1¾ by 17-in. strips, same thickness as panel material

2 — 1¾ by 20½-in. or exact length of panel

The steps in framing these pieces are as follows:

a) Glue and nail a 1¾ by 17-in. strip along the left hand edge of the board so that it is parallel and flush with the edge.

b) Place the master panel against this strip; now place the bottom 1¾ by 20½-in. strip tightly against the master panel and glue and nail it in place. It may not be parallel to the bottom edge but can be planed flush later.

c) The 1¾-in. strip for the top should then be placed against the master panel and glued and nailed in place. If a cutout for the lettering triangle is desired as shown in Figure 3, it would be best to cut it out before fastening this strip to the board.

d) Now place the right hand 1¾ by 17-in. strip in place checking to make certain that it is flush with the upper and lower strip as well as the master panel. The panel should be framed by these strips, and should just fit snugly without binding.

e) If grooves for pencils are desired at the top they can be routed out or chiseled out with a small gouge.

f) The left hand edge should be planed carefully so as to furnish a straight edge for the T square. Make the strip and board flush. Now plane all other edges flush and slightly round off corners for better wear.

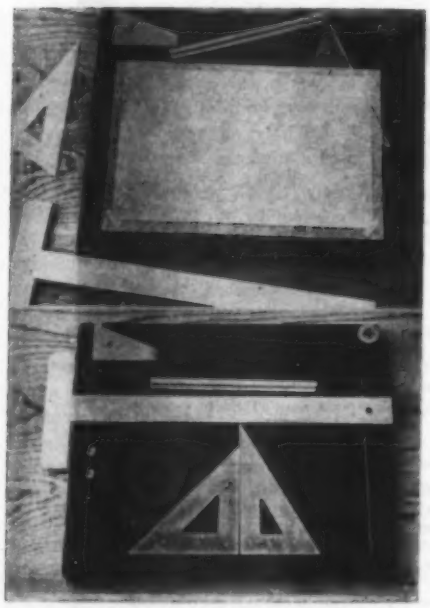


Fig. 1. Drawing board remodeled to hold the student's drawing panel

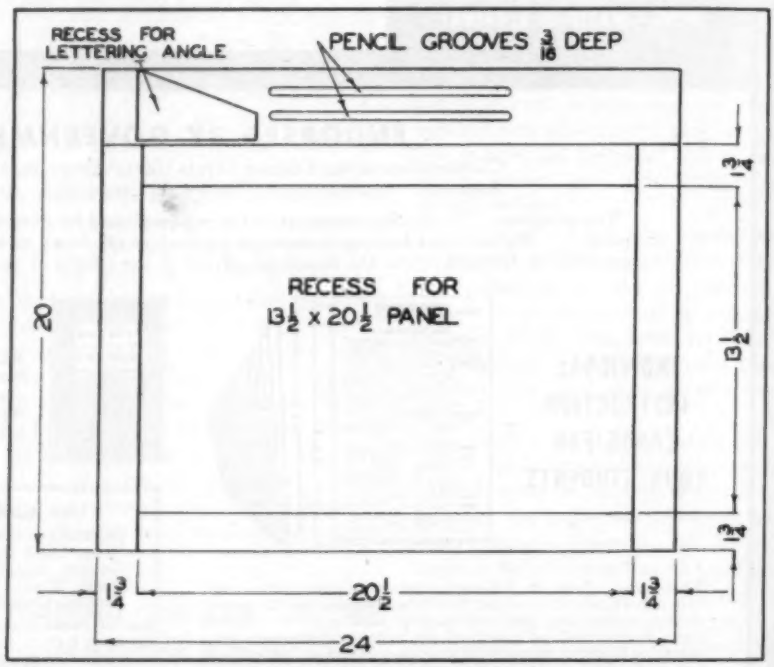


Fig. 3. Drawing board ready for the panel

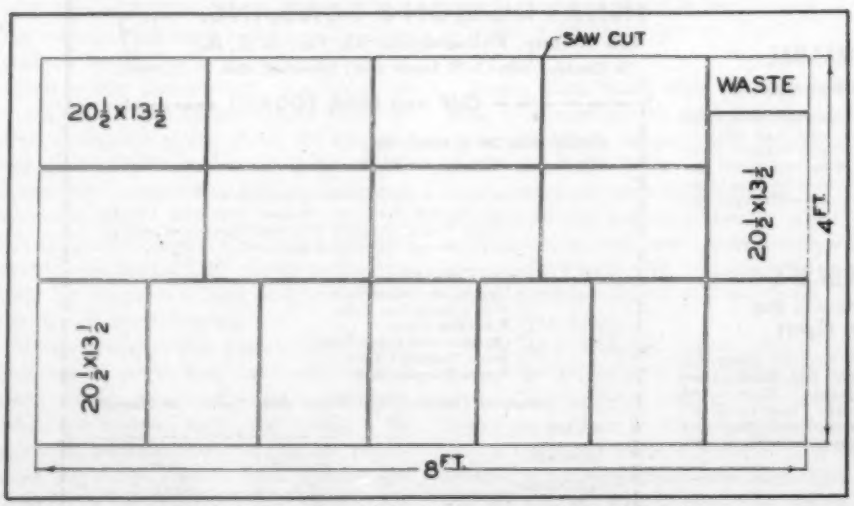


Fig. 2. Panels cut from Masonite or Upson board

g) Use a 1-in. auger bit for cutting out the two finger holes on the left hand edge used for removing the panel. Drill half on the strip and half into panel section, use a piece of scrap of panel thickness to keep drill from walking off line. Drill about ⅜ in. deep into board.

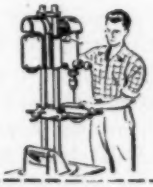
h) It is advisable to smooth off all edges with sandpaper and give a base coat of shellac. Follow this with a coat of good grade black enamel, painting the entire board except the left hand edge where the T square rides. Paint the pencil grooves, lettering-triangle recess and finger holes a bright red enamel. These contrasting colors add a great deal to the attractiveness of the room. The black enamel discourages marking by the careless student and furnishes a type of good color border to prevent eyestrain.

The author has always furnished each board with a T square, scale, 45 deg., 30–60 deg.,

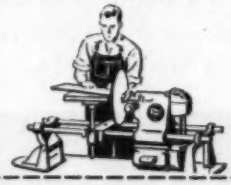
(Continued on page 24A)

SHOPSMITH . . .

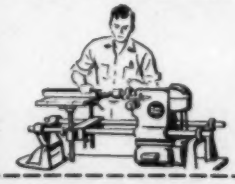
key to the FLEXIBLE SHOP



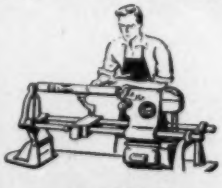
Imagine a school shop so completely equipped that every student has the power tool he needs *when he needs it.* No waiting. No congestion. No danger-laden "hurry-up" pressure on students using power equipment. Think what such a shop could do for the enthusiasm of students, the peace of mind of instructors.



Imagine a shop so completely adaptable that it can be all lathes or all drill presses one period, and the next period a complete assortment of different power tools – *with changes requiring less than a minute per machine.* A shop that can be fitted quickly and easily to the progress and projects of any group, beginners or advanced.



Such a shop is the FLEXIBLE SHOP. And the one power tool that makes it possible and practical is SHOPSMITH. In each basic position – saw, sander, lathe, vertical or horizontal drill press—SHOPSMITH is essentially the same as a high-quality, single-purpose power tool, often outperforms that tool in accuracy, capacity, durability.



Basic SHOPSMITH, less motor, costs $189.50; with special school guards, $197.95. Requires a storage area of only 18″ x 60″ and a working area of 6′ x 8′. Compact, rugged and safe, SHOPSMITH provides a more efficient work station than any other power tool in your shop. Completely tested and approved by shop instructors. Write for specifications and information.

SHOP SMITH

SHOPSMITH, Dept. 158-U, at factory nearest you:
12819 Colt Road, Cleveland 8, Ohio, OR
417 Montgomery Street, San Francisco 4, California

Please send me complete information about the FLEXIBLE SHOP and the applications of SHOPSMITH to industrial arts education.

Name _____ Position _____

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Address _____

City _____ Zone _____ State _____

2⅜-inch Capacity — Cuts finished 2x4s at 45° mitre

POWERFUL
COMPACT
RUGGED
SAFE

A New Champion

for faster, easier sawing

$75.00

complete with enameled steel carrying case

Here is an outstanding new value — ideal for school shop use. Driven by a full ½ h.p., it has ample power, and its 7-inch blade will handle 90% of all regular sawing jobs. Light, compact and balanced to a T — it's ruggedly built. Using abrasive discs, it cuts metals, concrete, tile, etc. At only $75.00, it's one of the finest values we've ever offered.

Here are the big features of Millers Falls new No. 700 7-inch Portable Electric Saw

- Light weight — only 11 lbs. — yet ample power for construction and general purpose sawing.
- Precision cut, helical gears. Ball bearings throughout. Extra rigid steel base with adjustable ripping guide.
- Uses any standard 7-inch blades and abrasive discs with ⅝-inch arbor hole.
- Compact and easy to handle — the smallest size saw that will take 45° cuts in finished 2x4s.
- Quick, simple, positive adjustments for depth (2⅜" to ¾") and angle (90° to 45°).
- Safety assured by completely guarded saw and instant trigger switch control.

Write for full details on the new Millers Falls No. 700 Saw and your copy of Catalog No. 49 illustrating and describing the whole line of Millers Falls quality hand and electric tools.

Millers Falls Company • Greenfield, Mass.

MILLERS FALLS TOOLS
SINCE 1868
The Mark of Superiority

IMPROVING THE DRAWING BOARD

(Continued from page 22A)

and lettering triangles. These tools remain on the bench at all times. The furnishing of these tools and panels saves the pupil a great deal of expense and tends toward uniformity of opportunity. The presence of a complete set of tools makes certain that each pupil is equipped at all times to do a full period of work.

The author has made a cursory examination of the accomplishment of other classes of like grade levels and it is apparent that the efficiency of this equipment has worked for additional completed plates with a high level of attainment.

Revamped drawing boards in use

* * *

Cutbacks in the use of aluminum for civilian goods, are necessary because of the many military uses for this metal at this time. The army needs aluminum for making 3.5-in. rocket-launching super bazookas, rockets and other rocket launching equipment; G.I. helmets; aircraft landing mats; tactical and floating bridges; towers for creating the National radar screen; radar equipment; walkie talkies; fire control towers; portable shelters; mess kits; construction equipment, such as bulldozers; "invasion pipe" for fuel lines; piping and shipping containers for handling rocket fuel chemicals; PT boats, submarines, amphibious vehicles and all kinds of ships; unloading ramps and related assault equipment; water and fuel tanks; foil for radar reflection and for packaging food and metal parts; field kitchen equipment; firearms; engine parts for tanks, trucks and other vehicles; medical field chests; and numerous other applications, many of which are classified.

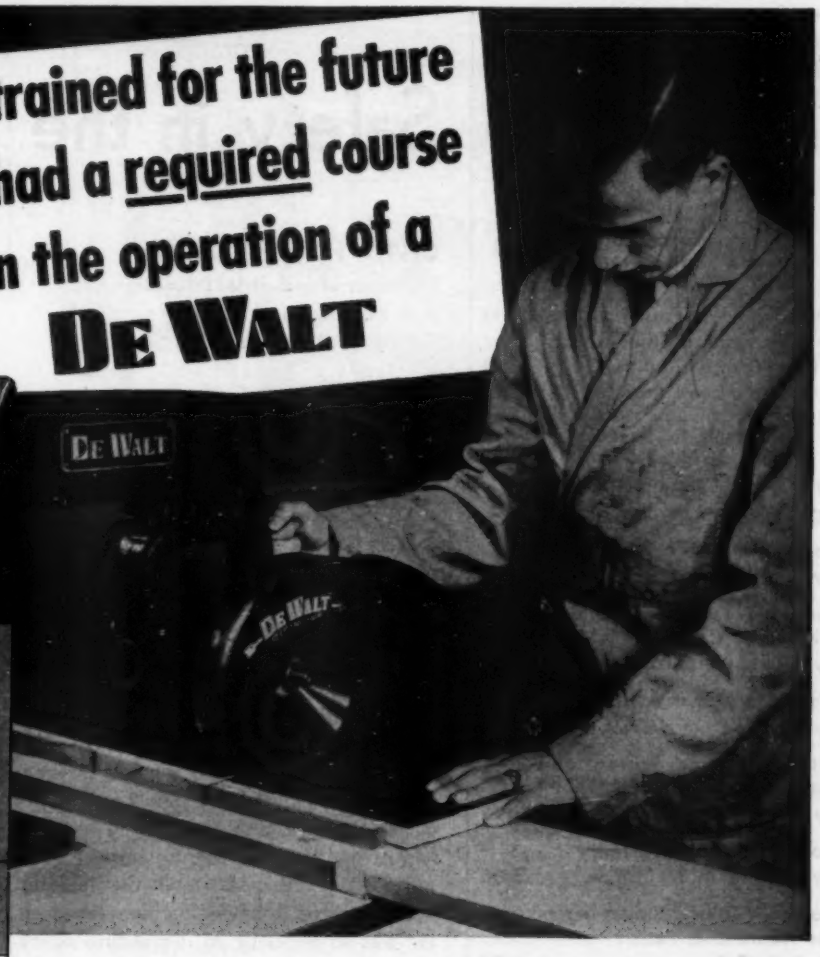
* * *

Some 50 tons of aluminum are used in the air force B-36 bomber.

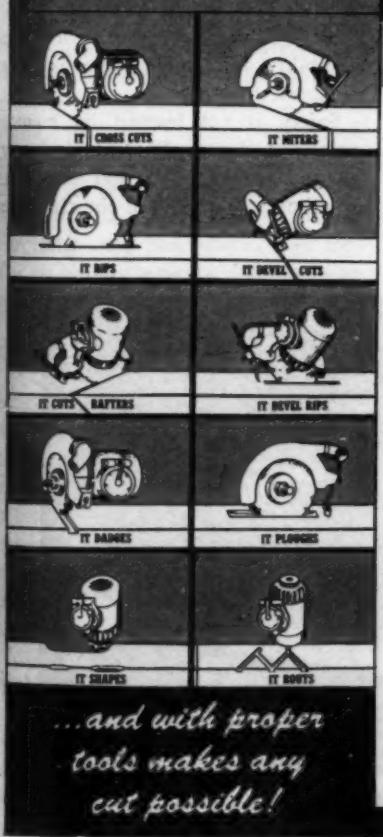
Machine-shop student at Milwaukee Vocational and Adult Schools, Milwaukee, Wis.

— Photograph, Stanley O. Opsahl, instructor of photography

He's really trained for the future when he's had a required course in the operation of a DE WALT



DE WALT is a complete shop in itself



...and with proper tools makes any cut possible!

After the student has completed his basic training course in the use of hand tools, he should have a required course in the operation of De Walt.

Knowing how to make the fullest use of this flexible, easy-to-operate machine, will give any student a head-start as he prepares for tomorrow's industry.

When he leaves school he will be fully acquainted with a machine that is destined to occupy a prominent place in tomorrow's industry. The perfection of the De Walt saw has created new methods in cutting wood, making obsolete old-style equipment previously used.

Ask a nearby De Walt dealer about two De Walt 16MM movies—one showing the general application of De Walt — the other showing modern, pre-cutting techniques developed during the war. Write for catalog.

DE WALT, INC.

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Do you want more time for demonstrations? individual instruction? industrial surveys? planning? counselling? keeping up-to-date in your trade?

Hundreds of vocational instructors who have experienced the effectiveness and time-saving qualities of a good textbook now have time for such vital activities.

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   By Uhl-Dunlap-Flynn..... **3.95**
5. **Commercial Photography**
   By Kenneth M. McCombs.... **5.00**
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Safety in the School Shop

CHRIS H. GRONEMAN
Professor of Industrial Education
A. & M. College of Texas
College Station, Tex.

The teaching and observance of an adequate shop safety program is very much like the remarks about the weather; everyone talks about it, but not enough teachers and other keymen do anything about it in concerted, continuous action. Recently a foreman of an electric crew was instructing several new employees on how to climb poles. After the series of orientation lessons, which consisted of lectures and demonstrations, the foreman gave a bit of warning to the effect that the first man who attempted to climb a pole without safety garb, need not wait to be notified of his discharge but to consider himself fired at once. Above all, the manager was interested in safety for his personnel. He was so emphatic in demanding safety precautions that he was willing to take the trouble to break in or train another employee if one of his group should fail to respect safety.

Marking the Beginner

It is reported that one of the larger automotive manufacturing companies has the policy of requiring all new employees who work in the shop to wear some special designated piece of apparel, such as a red cap so that leadmen, foremen, supervisors, and more experienced workmen will recognize the identity of the new employees and will make a special effort to guide them in the shop practices so that safety regulations will be complied and a maximum of accomplishment will result. Employers usually consider the first six months to one year training period as a liability to the industry. Naturally the expense incurred is no small item. One of the reasons for the new worker being considered a liability is that he may retard the other workers of his department because he is not acquainted with newer production methods and hence is probably not safety minded; thus he becomes an accident possibility and accident expenses are not conducive to profits.

Safety is not learned by memorizing codes and slogans. Students and new employees are eager to find out facts by experimentation. One of the chief hazards

Saw guards may be rebuilt with the use of clear plastic to make operations visible and still protect the worker

to safe practice in industry during the war period was the apparent neglect to stress the importance toward safety precautions. New employees and students are potential daredevils, always anxious to meddle with anything about which they are warned. Safety signs are usually as effective as "wet paint" signs. People must touch the wet paint to find out how far the drying has progressed. "Don't" is also a negative guidance and the reaction is usually opposite from the intention. The foregoing statements are not to imply that signs are not effective; they are, but they are intended only to supplement the proper instruction; they should not and cannot take the place of a well-planned instructional or training program.

One of the chief aims of every safety program is to develop safety habits, safety skills, and safety attitudes which will decrease the number of accidents and give the worker freedom from fear and other conditions which may restrict his enjoyment of working to the fullest extent. It may readily be seen that the safety program must be a continuous process which cannot be completed in one lesson, one day, one week, or in any given length of time. Safety must be co-ordinated into a well-planned program and should never be considered an incidental matter. Safety procedures should be started with the first lesson of the newest job, whether in school or in industry, and to continue throughout the entire job or school year. A lessening of emphasis on safety permits the acquisition of improper safety practices which, after working with hand tools, may frequently be carried over to the improper operation of machine tools.

Safety in School Programs

School administrators, supervisors, teachers, students, and parents are becoming conscious of the value of safety in the school program. Naturally, one of the best places for the proper application of safety would be in the school shop or laboratory. One of the major objectives for teaching industrial-arts education which is listed in the Bulletin, "Improving Instruction in the Industrial Arts" is to develop in each pupil dependable attitudes and practices with respect to health and safety. This publication is a recent release of the industrial-arts division of the American Vocational Education, Inc., Headquarters in Wash-

(Continued on next page)

TEACHERS! There's still time for your students to enter Ford's annual I.A.A. competition and for you to win a prize. Entries close in June. Projects should be shipped express prepaid. If any of your students have outstanding projects completed or nearly so, write for Entry Forms and be sure the projects are completed and shipped in time to meet the deadline for your particular region. (See below for dates.)

HOW TO PACK AND SHIP I.A.A. ENTRIES . . .

Every possible step has been taken this year to safeguard entries being shipped to and from I.A.A. Local Railway Express agents are cooperating to advise entrants on correct shipping methods and will check entries before accepting them for shipment. Here are some general instructions recommended by the Railway Express Agency:

1. **PACK projects in new corrugated containers, wooden boxes, or crates.**
2. **PLACE sufficient cushioning material such as excelsior or shredded paper on top, bottom and sides of container.**
3. **AFFIX TWO address labels.**
4. **DESCRIBE the contents *clearly* on top of container.**
5. **PLACE labels (such as *"Fragile," "This Side Up,"* etc.) on top and sides of container to insure proper handling.**

Drawing and printing projects will require a different packing method. Wrap in sheets of corrugated cardboard and then wrap in heavy kraft paper before placing in corrugated containers. Lamp stands should be crated and lamp shades packed separately.

WHERE TO SHIP I.A.A. ENTRIES . . .

Following are the addresses of the three receiving points. (See Rules Handbook for breakdown by states):

Ford Motor Company
Industrial Arts Awards
California State Exposition Building
Exposition Park
Los Angeles 7, California

Ford Motor Company
Industrial Arts Awards
ABC Fireproof Warehouse Company
1015 E. Eighth Street
Kansas City 6-E, Missouri

Ford Motor Company
Industrial Arts Awards
Franklin Institute
Philadelphia 3, Pennsylvania

WHEN TO SHIP I.A.A. ENTRIES . . .

Dates for receiving entries are:
Western Region—June 1 to June 20;
Central Region—May 25 to June 10;
Eastern Region—June 4 to June 18.

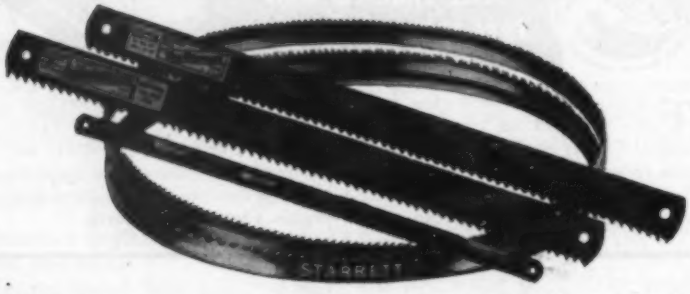
IF YOU HAVE NOT ALREADY OBTAINED YOUR ENTRY BLANKS WRITE AT ONCE TO:

Industrial Arts Awards
Sponsored by
FORD MOTOR COMPANY

INDUSTRIAL ARTS AWARDS
Ford Motor Company,
2917 Schaefer Rd., Dearborn, Michigan
Please send me the 1951 Rules Handbook and _____ entry blanks for the 1951 Ford Motor Company Industrial Arts Awards.
*Name*_____
*Street*_____
*City*_____ *State*_____
*I teach*_____ *at*_____ *school*

THE SAME NAME Starrett

Your Guide To Greater Value in HACKSAWS AND BAND SAWS



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SAFETY IN THE SCHOOL SHOP

(Continued from previous page)

ington, D. C. It is a revision of a previous similar bulletin. The objective just listed, is one of the newer for shop teaching which means that teachers were favorable to the adaption of this objective. As a definite objective, safety should be incorporated in every course of an industrial nature. In following this simple formula the student will be made aware of the importance of the proper respect for tools, equipment, materials, and last but not least himself. It is said that proper instruction, can reduce the possibility of accidents by more than 20 per cent. Most accidents which develop are the result of negligence on observing the proper cautions, or they are due to failure of proper instruction. It is inconceivable why a teacher will permit unsafe practices within a school shop or laboratory when he realizes that the same practices will not be tolerated in industry. In fact many employees are released because they apply unsafe practices in their work.

Grinders should be well guarded with protective shields to insure safe working conditions

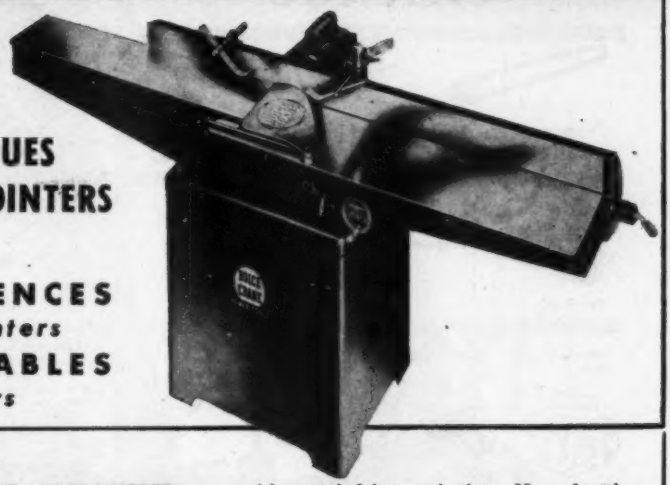
It is most distressing to visit an industrial-arts department and to see a student at work on a grinder without proper goggles and with no respect for even the simplest safety rules. The teacher usually has an answer for his negligence stating that the student has been told or warned but that the student is too lazy to go to his office or to him to secure a pair of goggles. Efficient thinking and well-planned action in placing safety equipment should be the aim of every teacher. The needed safety equipment can be attached to the machine or made available so near to it that the worker can secure this protection by merely reaching for it. Another unsafe practice is to permit the student to work on a circular saw without a guard. Again the usual response is that he is unable to see his work if it is covered with a guard. The alert and progressive teacher will replace the invisible metal guard with one of the newer clear plastic visible devices. If one is not readily available, it may be made. Where the new type of visible guard has been in use for some time it has been observed that students respect its use and feel more confident to resume their task because of the added protection. Any resourceful and progressive teacher will always find methods of improving guards so that they will not be objectional to the user.

A Neat Shop Promotes Safety

A neater kept shop or laboratory will

(Continued on page 30A)

Announcing BOICE-CRANE'S NEW, LONGER TABLE JOINTERS



THE BIGGEST VALUES IN 6" AND 8" JOINTERS

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THE LONGEST FENCES
of any 6" or 8" Jointers
THE LONGEST TABLES
of any 8" Jointers

Planing Mill Ruggedness — Cabinet Shop Accuracy — School Safety Engineered

NEW, WELDED, ALL-STEEL CONSTRUCTION

Permits strength, permanent accuracy and alignment, impossible with bolted-up cast iron construction which tends to warp and is vulnerable to breakage.

In jointer design there is a definite relationship between fence length and table length. Lengthening of a table alone is not sufficient to increase the scope of use of a jointer. The fence, likewise, must be extended and should always be as long as the infeed table plus 60% of the length of the outfeed table and ABSOLUTELY RIGID ALONG ITS ENTIRE LENGTH. To assure accuracy and avoid work spoilage, tables and fences furthermore must be absolutely flat and straight, AND STAY IN THAT CONDITION regardless of abnormal operating conditions.

LENGTH WITHOUT WASTEFUL UNUSED WIDTH

Using steel, (2½ times as strong as cast iron of same thickness) jointer tables can be extended without increasing width, thickness, weight or floor space. A cast iron jointer comparable all ways to Boice-Crane's new jointers would weigh more than twice as much.

NO SPRINGY OVERHANGING TABLES TO SPOIL WORK

Tables undergirded full length. No overhanging ends to spring when jointing heavy timbers.

THE ENTIRE INFEED TABLE A RABBET ARM

Three more inches of support the *full length* of the rabbetting side of the infeed table, the first jointers with adequate support for narrow rabbetting on wide stock.

TABLES GROUND FLAT, STAY FLAT

After permanently welding all members together, both tables are simultaneously ground flat and parallel to closest limits, permanently distortion-free.

QUICK, POSITIVE, MICROMETER-ACCURATE KNIFE SETTING FINISHES BETTER — OPERATES SMOOTHER

First, a special ground steel bar (standard equipment) is employed as a positive setting stop. Then, the knife ends are *raised* by a screw lifter to micrometer-accurate setting. Unlike time wasting trial and error compensations required at this stage in conventional systems, and which attain only reasonable accuracy, the Boice-Crane knife lifter on the very first try, sets and holds the knife *exactly* in position while tightening the locking screws. All knives cut the exact same depth, within .002" to .003" — setting a new standard for perfect work without chatter marks.

LARGER HEAD DIAMETER IMPROVED CUTTING ANGLE

3¼-inch diameter head (3⅛-inch cutting circle), 20% larger than conventional 6-inch jointers.

The 8-inch has *four* knives, the 6-inch *three* knives, delivering 14,400 and 10,800 cuts per minute respectively. A new, improved, gentler cutting angle cuts rather than scrapes.

THE ONLY LONG-TABLE JOINTERS AT ANY PRICE, WITH FULL-LENGTH, FRONT-ADJUSTING, DOUBLE-LOCKED FENCES

The fences are amazingly rigid box-type steel main-members and double locked. The rear, or second, fence lock is on the *infeed* table, not the outfeed, so that after the fence has been doubled-locked, depth adjustment is made without disturbing the locked fence. This time-saving arrangement available only on the new Boice-Crane.

ALL CONTROLS CONVENIENTLY GROUPED AT *FRONT* — DESIGNED FOR WORKING COMFORT

The depth of cut control, two table locks, direct reading depth scale and switch can be easily used in a comfortable, normal operating position and without squatting, squinting, working in close quarters and skinning knuckles. No projecting switches, exposed wiring or bulging projections. Now, for the first time, you can stand up to a jointer and work in comfort.

CONVENIENT GUARD — ANOTHER BOICE-CRANE EXCLUSIVE

When rabbetting, guard stays right on the machine — simply turn and swing out of the way. When finished, swing it back into safety position.

NEW ROTOR-ON-CUTTERHEAD OR V-BELT DRIVE OPTIONAL

100% efficient power transmission plus smoother operation through the elimination of vibration. Easily removable rotor.

Despite all the many advantages gained by Boice-Crane's new type construction, production economies have been simultaneously effected so that you don't pay a big premium to enjoy these advantages and added capacities.

Boice-Crane now offers the following complete line of job-rated jointers —

Model No.	Size	Recommended for stock length to	Length being a factor, recommended for timber sizes to	Planes boards and panels to
3400	8" x 84"	16 ft.	8" x 8"	16" wide
2400	6" x 60"	12 ft.	6" x 6"	12" wide
1400	6" x 36"	8 ft.	4" x 6"	12" wide

Use coupon to obtain further details.

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☐ Please send free literature on the new Boice-Crane Jointers.

☐ New 44-page Catalog No. 50 on entire line.

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CHICAGO

Large Full Bowl Headstock Completely enclosed with hinged cover.
Zero Precision Timken Taper Roller Bearings
Most accurate obtainable
Double V-Belts to spindle deliver more power to point of work.
1 ⅝" hole thru Spindle (greater capacity)
Full Box (Double Wall) Aprons
(Rear View)
Scientific distribution of mass gives bed extreme rigidity.
Heavy Saddle has extra bearing on bed.
Takes up to 1 ½ H.P. Capacitor Type Motor
Efficient 4-step (8-speed) V-Belt Underneath Motor Drives carries thru standard bed — no cut-away or "split" beds.
Each Sheldon lathe must pass 18 tests for extreme accuracy before leaving factory.

THESE FEATURES make Sheldon Precision Lathes the finest school lathes — give them industrial accuracy and power. With these real industrial machine tools you can teach true industrial shop practice. Because of these features Sheldon Lathes withstand "student abuse" and hold their accuracy without constant bearing maintenance. They are safe for students to operate.

Write for Bulletin describing the new "C" Series Lathes designed for schools where space or budgets are restricted.

SHELDON MACHINE CO., Inc. 4244 N. Knox Avenue CHICAGO 41, U. S. A.

SAFETY IN THE SCHOOL SHOP

(Continued from page 28A)

aid in the reduction of accidents. The poorly kept shop is overflowing with dangers. Confusion breeds danger, therefore it is essential to maintain a well-organized and managed school shop or laboratory.

Every teacher has the individual problem of analyzing the hazards of his particular shop situation to determine the most suitable methods of overcoming possible dangers. If an accident should happen, the teacher should be able to apply first aid immediately. He should then analyze with the student why and how the accident occurred and how it might have been prevented. Even though such demonstrations are often costly they are realistic and will not be forgotten soon. One of the most effective methods of providing safety consciousness on the part of the students is to demonstrate the proper use of hand tools and to equip machines with attractive and useful guards. Daily lessons and demonstrations should be supplemented with some form of visual aids which may be posters, charts, models, and any of the innumerable projection type of films. Since people apparently remember approximately 58 per cent of what they see 48 hours after they see it, and their retention of facts is only about 20 per cent effective of what they hear over the same period of time, it is evident that visual methods should be used to supplement verbal instruction. Aids of this type are not to be construed as substitutes for proper instruction but to upgrade the instruction as it existed. Some indications of proper safety instruction will be reflected through the following additional measures:

Safety Practices

1. *Safety should be taught as a part of every lesson.*

2. *The shop or laboratory should have adequate lighting.* A candle power meter reading should be made of all parts of the shop to ascertain the illumination in the area of the room. Most lighting and power companies will be glad to assist in making this reading.

3. *Equipment should be properly spaced and aligned.* Many interesting magazine articles have been released recently with respect to the placement of equipment and the allocation of space within the shop to obtain the maximum natural and artificial illumination and to provide safety between machines.

4. *A shop or laboratory should be kept clean.* Visitors form an immediate impression through the general tidyness and cleanliness of the school shop. There is a decided difference between dirty dirt and clean dirt. Shavings and other salvage materials will naturally accumulate in the shop during the day, but such by-products are easily discernible from the general confusion of an accumulation which has been carried over from several weeks through the negligent attitude on the part of the teacher.

5. *Dress properly for the occasion.* Athletic teams dress for their particular sport with the fullest respect for safety. Often school students do not heed this advice. One who works over the metal cutting lathe with long hair and a loose necktie may find himself seriously injured by not respecting safety practices. Many instructors and their students wear shop aprons or some other protective garment while in class.

(Continued on page 32A)

In TODAY'S *Graphic Arts Instruction*

OFFSET'S A MUST!

Offset is already as essential a part of modern printing as letterpress, and is growing rapidly in importance. Practically any shop the student eventually enters will have an offset department, usually equipped with one or more ATF Chief offset presses. For the same reasons that printers choose ATF Chiefs for high quality, fast and profitable production, these presses offer numerous advantages for student instruction. Their design and construction are easy to understand, their complete facilities and simple adjustments for the finest offset work are readily mastered by the students. What they learn on a Chief will give them complete command of any other sheet-fed offset press.

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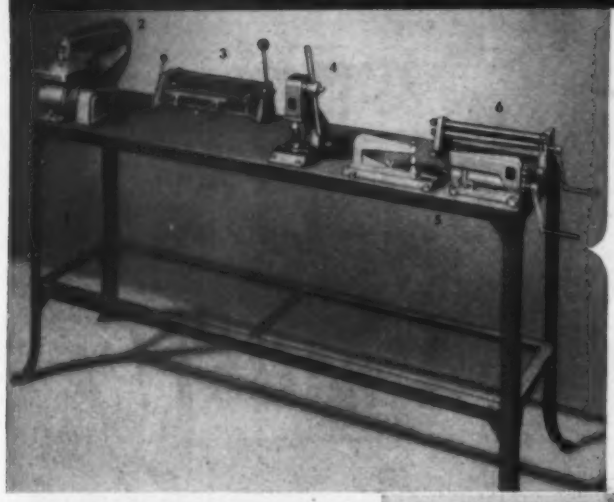
BERKROY SHEET METAL TOOLS



1. **TOOL STAND** Heavy gauge steel. 18" x 68" x 35".
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SAFETY IN THE SCHOOL SHOP

(Continued from page 30A)

6. *Use student personnel in shop management.* Proper organization in shop management will aid a safety program materially. Discipline will be observed, with the result that the too frequent tendency to scuffle will be minimized. The students will recognize properly taught industrial safety practices because they acquired safety habits due to proper instructions.

7. *Use appropriate machinery.* Even though power machinery may not be the cause of most of the shop accidents, machines can be dangerous when not used properly, with the possible loss of a finger, a hand, or a limb. A few signs over machines may be somewhat effective while a nonskid floor covering near the machine may protect the worker from a slick floor. These methods are in use in industry, however many schools have no sign of such protection. Some states have industrial safety inspectors who assist to correct improper safety practices.

8. *Hand tools should be in proper condition.* One of the most frequent accident causes are dull tools for which there is no excuse. A teacher should see that proper instructions are given for sharpening of the common hand tools or he should be responsible for having them sharpened. Frequently hand tools have parts missing and in this stage they become dangerous tools because the students are not aware of the missing parts. Fewer accidents occur with sharp tools than with dull tools.

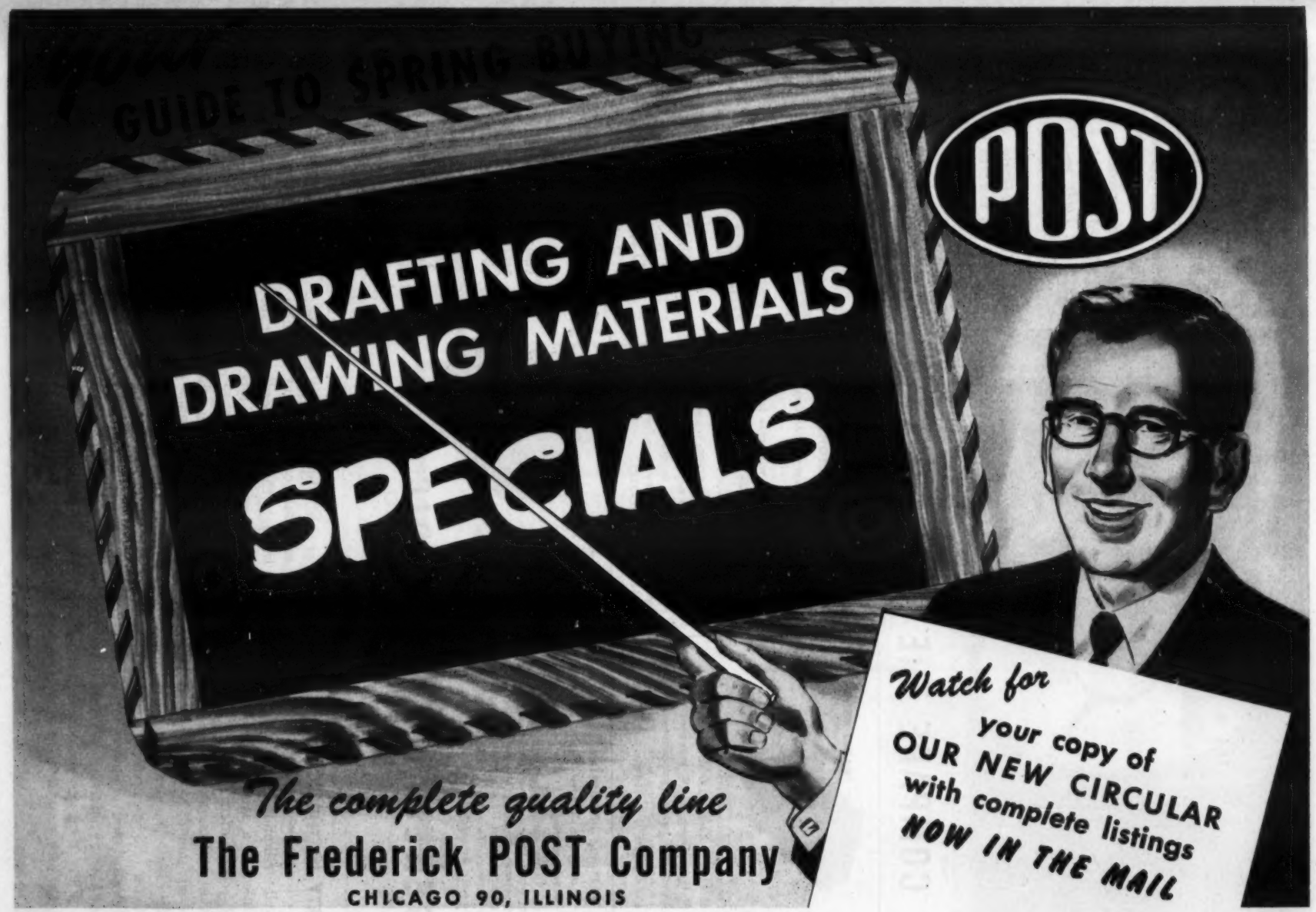
9. *Utilize dynamic color schemes for shop and laboratory.* Interesting illustrative magazine articles and advertisements are prevalent in our professional magazines on the safety values and the effectiveness of color treatment on equipment. The Pittsburgh Paint Company and the Dupont Corp. are two of the larger companies who released colored bulletins on color dynamics as they pertain to school plants and in particular to school shops. These bulletins are available without cost. Experiments on color effects have been in operation several years; war industry provided excellent opportunities for use, with the result that many school shops are now painting the shop equipment and walls to give the appearance of an industrial laboratory. This is sound industrial practice and should be encouraged within the schools because of the direct effect of safe practice with tools and equipment.

10. *Make adjustments on equipment while the switches are turned off.* It is a disgrace to the teacher to see a student attempting to make a major adjustment on a piece of power equipment while the electrical motor or motors are still on. Even changing an abrasive belt on a portable sander without disengaging the pronged plug from the wall outlet is dangerous.

11. *Protect the shop from fire hazards.* Fire extinguishers should be in evidence in every shop in sufficient number to be of assistance in case of sudden outbreak of fire. While fires seldom develop in a school shop, yet one of the worst school catastrophes of all times started in the school shop of the New London, Texas, High School in 1937, which claimed the lives of several hundred school children.

12. *Proper metal receptacles for volatile liquids.* If gasoline blowtorches are used within the school shop, they should be refilled outside the shop. The storage of gasoline should be outdoors. Wherever

(Continued on page 34A)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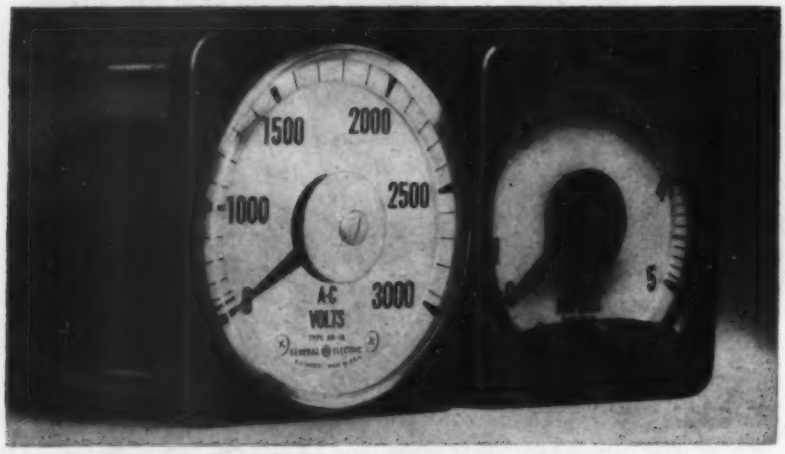

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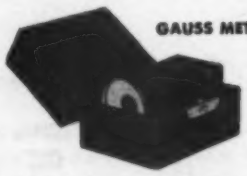

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Types AP-9 and DP-9

GENERAL ELECTRIC

SAFETY IN THE SCHOOL SHOP

(Continued from page 32A)

other volatile liquids are kept, they should be enclosed in a safe storage.

13. *Electric outlets should be protected.* Electrical outlets and other electrical connections should be protected so that students cannot tamper with wires and connections. All equipment should be properly wired and grounded for safety.

14. *Lift heavy materials properly.* One of the safety measures should deal with the proper lifting and handling of heavy lumber or steel. Students in the adolescent period may subject themselves to undue strain through the improper manner of handling. An injury of this type may not be apparent for decades. Safety procedures and class discussions can do much to improve lifting and handling techniques.

15. *Use the correct tool for the particular job.* Use of the right tool for doing particular operations will reduce the tendency for accidents. It is an evidence of poor teaching when a student uses a try square for a hammer or misuses any of the wrenches. In addition to making himself liable for an accident, the student certainly is not getting the proper training in using his tools.

16. *Store waste properly.* Waste rags are essential in maintaining a clean shop, but they should be kept in a proper metal storage receptacle in a convenient place. Soiled rags not only produce a fire hazard, but they prove unsafe for students when allowed to remain on benches or on floors.

17. *Tools should be properly dressed.* Mushroom heads on punches, chisels, and hammers are dangerous. In addition to being unsafe the workman will probably find his work to be of inferior quality.

18. *Have adequate protection from hot metals.* Hot metals are frequently the source for injuries due to negligence and unawareness in errors of handling. Some common sense in application will correct many errors of this description.

19. *Have a first aid center.* Every shop or industrial-arts enterprise should have a place for first aid supplies. Major industrial firms have special rooms or departments to render first aid at the instant of injury. This often protects the workman from future pain and possible loss of limb. Every shop instructor should have at least an elementary knowledge of first aid application.

If the foregoing techniques of safety are intelligently presented to the student, and observation of them stressed at all times, no shop teacher, foreman, or supervisor will be unduly embarrassed by an accident occurring to one under his supervision, due to improper instruction.

As the industrial world progresses technologically, the school shop should and must initiate the boy into the proper atmosphere of careful workmanship and industrial safety.

RESEARCH FINDS METHOD FOR PREVENTING BROWN STAIN IN SUGAR PINE

The Western Pine association's research laboratory in Portland reports that minor alterations in manufacturing routines can virtually eliminate brown stain in sugar pine lumber.

The findings were based on a year-long study made by Dr. A. W. Stout, laboratory chemist, at the Collins Pine Company, Chester, Calif. His investigation affirmed previous research discoveries that storage time at any

(Continued on page 37A)

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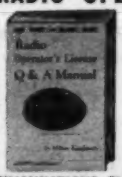

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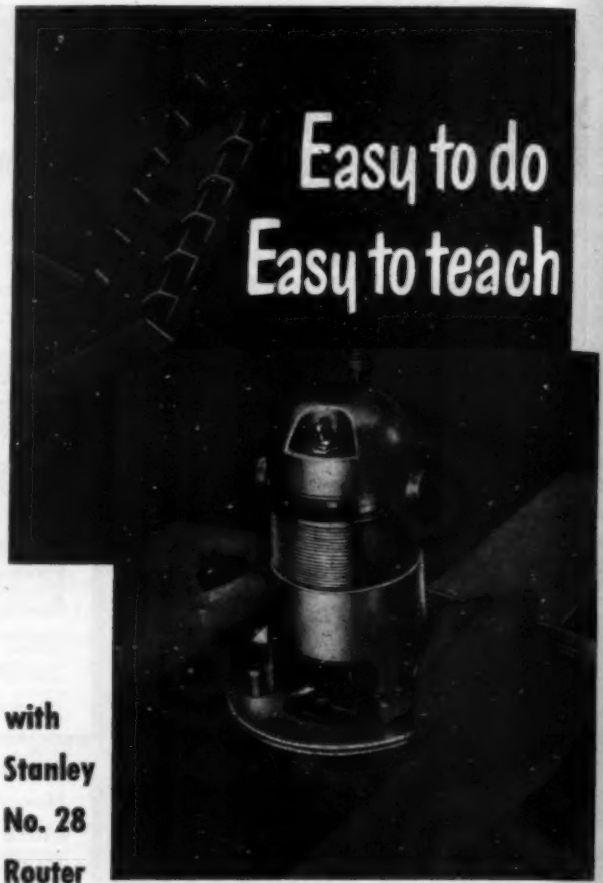

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PREVENTING BROWN STAIN IN SUGAR PINE

(Continued from page 34A)

point in the harvesting or manufacturing processes prior to seasoning is instrumental in producing stain.

"Most important to prevention of brown stain development." Stout said, "is rapid handling of green lumber between the time it is sawed and the time it is placed in the dry kiln. It is here that most brown stain, which appears only after seasoning has been completed, apparently gets its start."

Curiously, the study showed that air seasoned lumber develops little stain.

In his research, the Western Pine chemist studied all methods of logging and manufacturing commonly used in the sugar pine producing areas. It included "hot logging" wherein logs are felled, immediately hauled to the mill and sawn at once, and storage logging, where logs are stored in the woods, in cold deck or in mill pond for periods ranging from two months to one year. Logs were carefully marked dated, then tracked through the mill and, in sawn form, through the dry kiln.

Where other conditions were equal, lumber from older logs tended to develop more brown stain than did stock from freshly cut specimens. But the time in bulk piling between sawing and stickering for drying proved to be the greatest single factor in bringing about brown stain development.

Incidentally, Stout said the basic reason for brown stain remains a mystery despite many chemical and physical analyses carried on over a period of years.

Percentage of degrade in lumber from fresh logs varied in the test from 0 to 2 per cent in stock solid piled for two days, to 41 to 70 per cent in stock solid piled for 14 days prior to placing it in the dry kiln. Heartwood showed less stain than did sapwood and sinker stock, particularly in fresh logs, but quite consistently throughout all segregations.

Stout also reported that 1½-inch stock was generally more heavily stained than 1-inch stock. He said that logs in woods storage were less damaged than those stored in the pond or decked at the mill, presumably due to cooler weather prevailing at the higher woods altitudes.

The brown stain discovery is another in a series of manufacturing and product developments the association's research lab has accomplished since it was founded more than a quarter of a century ago. Others have included penthachlorphenol fungicide which revolutionized the wood window industry, WP-578 knot sealer which overnight made common lumber suitable for siding and extensive research into kiln seasoning schedules.

* * *

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ASSOCIATION NEWS

(Continued from page 6A)

MU CHAPTER, EPT OFFICERS

Officers of Mu Chapter of Epsilon Pi Tau at Indiana State Teachers College, Terre Haute, Ind., are: president, Leon Hunt; vice-president, Robert Beaman; secretary-treasurer, Dallas Chastain; faculty-trustee, Prof. A. H. Leuhring.

SPRING MEETING

The West Virginia Industrial Arts Teachers will hold their spring meeting at Jackson's Mill, April 20 and 21, 1951.

The main speakers will be Gerald Baysinger of Wayne University, Detroit, Mich., and George Fern of the Manufacturer's Association.

Local schools and colleges will have a display of industrial-arts work in the Grand Ballroom.

Prominent city, state, and national industrial-arts leaders have signified their intentions of being present.

♦ At the annual meeting of the New Mexico Vocational Association, held at Albuquerque, the following were elected officers for 1950-51: Wilson Willits, distributive education co-ordinator, Albuquerque, president; John T. Short, vocational agriculture instructor, Artesia, vice-president; and L. C. Dalton, state supervisor of agricultural education, State College, secretary-treasurer.

(Continued on next page)

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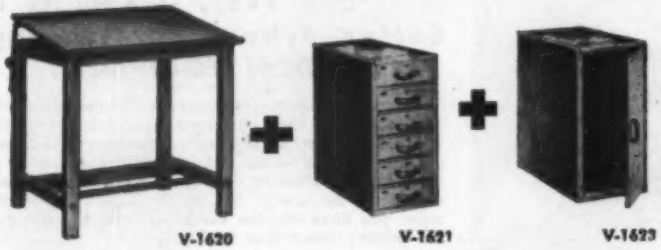

V-1620 V-1621 V-1623

Hamilton

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ASSOCIATION NEWS

(Continued from previous page)

♦ Officers for 1951 of the Iota Lambda Sigma professional fraternity in industrial education have been elected as follows: George F. Henry, Colorado A. & M. College, Fort Collins, president; Charles P. Scott, University of Pittsburgh, vice-president; Clyde H. Wilson, University of Tennessee, secretary-treasurer; and George Resides, State College, Pa., historian.

REHABILITATION THERAPISTS MEET

The annual convention of the American Association of Rehabilitation Therapists will be held at the Phoenix Hotel, Lexington, Ky., June 20, 21, and 22. All those interested in rehabilitation are invited to attend. Reservations for rooms or exhibit space may be sent to Joseph Harris, 844 Meadow Lane, Lexington, Ky.

* * *

More aluminum trucks and trailers were built in 1950 than in any other year in history.

* * *

Large quantities of aluminum powder, normally used in making aluminum paint, are now being shipped to manufacturers of explosives. Blockbusters, naval torpedoes, incendiary bombs and star shells are only a few uses of this important powder.

Personal News

HARRY E. WOOD DIES

Harry E. Wood, formerly director of practical arts and vocational education of the Indianapolis public schools, passed away January 21, 1951, after a two-week illness. Mr. Wood had served the Indianapolis schools nearly fifty years, 39 of them as director.

He was the author of *Progressive Problems in Mechanical Drawing*, and coauthor of *Pre-vocational and Industrial Arts*, and was preparing additional books at the time of his death.

Harry E. Wood

Mr. Wood served his profession in many ways, and was nationally recognized by committee assignments, and by teaching in summer sessions at various colleges and universities.

He was a member of Epsilon Pi Tau, Iota Lambda Sigma, a past president of the Indiana Industrial Education Association, and a life member of the American Vocational Association.

For many years, he was secretary of the Western Arts Association, which he also served as president.—*Alfred P. Smith.*

♦ A meritorious award for outstanding professional services in the field of vocational rehabilitation of the physically handicapped was made to WILLIAM F. FAULKES, chief of the Rehabilitation Division of the Wisconsin State Board of Vocational and Adult Education, on October 23 at the banquet session of the National Rehabilitation Association held at the Hotel Statler, New York City. The conference marked the twenty-fifth anniversary of the founding of the National Rehabilitation Association in Cleveland, Ohio, in 1925. Mr. Faulkes was one of the founders of the Association and its first president.

♦ ROBERT M. WINGER has been appointed assistant to the state director of vocational education department of public instruction, Lansing, Mich.

♦ The following individuals received master's degrees in industrial education from the University of Missouri at the June and August commencements, 1950: JOHN L. BEVILLE of Alabama; CHARLES CONRAD, JR., Cape Girardeau, Mo.; CORNELIUS R. JONGEDYK of Chicago, Ill.; JOHN W. KARNES, JR., Denton, TEX.; ROLAND F. NAGEL of Kirksville, Mo.; ROBERT W. CHICK, Columbia,

(Continued on page 40A)

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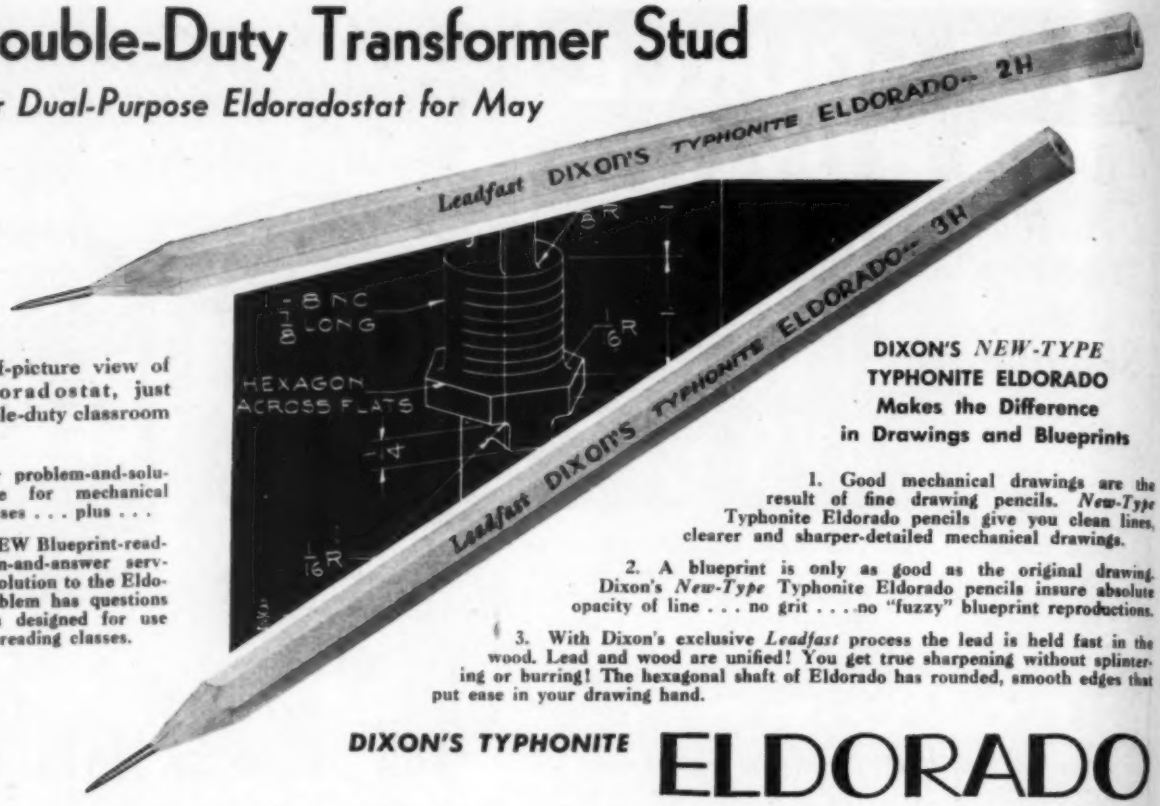

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PERSONAL NEWS

(Continued from page 38A)

Mo.; HAROLD W. CLOTWORTHY of Eldon, Mo.; GRADY W. DONALDSON of Statesboro, Ga.; KITTIE H. JONAKIN, Deering, Mo., WILLMAN A. MASSIE, Little Rock, Ark.; JOHN R. POSTMAN of Waupaca, Wis.; CHARLES W. STECK of Cape Girardeau, Mo.; and ROBERT C. WATERS of Newnan, Ga.

♦ EDGAR REDMAN, formerly vocational co-ordinator at Rushville, Ind., has been made industrial co-ordinator at Hamilton, Ohio.

♦ ROBERT MOORE, co-ordinator at Winchester, Ind., has been appointed vocational co-ordinator at Rushville, Ind.

♦ WILLIAM HODGES will replace Robert Moore as co-ordinator at Winchester, Ind.

♦ DAN C. SWANDER, JR., in addition to his duties as vice-president, has been made sales manager of the Columbian Vise and Manufacturing Company, Cleveland, Ohio.

♦ ROBERT CAMERON teaches machine-shop work at Horace Mann Junior High School in San Francisco, Calif.

♦ PINCKNEY COLEMAN is instructor at the Washington Technical High School in St. Louis, Mo.

♦ ELDER KILPINON is training co-ordinator for the Ford Motor Company at Buffalo, N. Y.

♦ DON HEALAS is at El Toro Marine Base near Santa Ana, Calif. He is writing lesson plans and teaching Marine corps subjects.

♦ GEORGE SCHUM has been appointed admissions counselor at Illinois Institute of Technology. He has been assistant director of admissions at Lake Forest College, Lake Forest, since 1948.

During 1947 and early 1948, Mr. Schum did children's recreation work with the Chicago Park System and with local YMCA's. He served as a fieldman for the Boy Scouts, and taught at Austin high school and other Chicago public schools.

♦ DR. KARL MENGER, professor of mathematics at Illinois Institute of Technology, will deliver a series of lectures during April and May on metric geometry at the Sorbonne University, Paris.

Mr. Menger, recognized as one of the world's foremost mathematicians, is the author of numerous articles and textbooks. He conceived and designed an unusual mathematics display now being installed in the Museum of Science and Industry, Chicago.

The exhibit, a graphic exposition of geometry, shows not only the useful aspects of the science, but its beautiful, clever, and amazing features. It will open in June.

♦ HAROLD J. BAUMAN joined the staff of the Office of Vocational Education on July 17 as supervisor of private trade schools. His responsibility will be the activities in the Department of Public Instruction in connection with private trade schools in the state.

♦ OTTO C. HEJKAL of Nebraska received his doctor's degree in industrial education from the University of Missouri in August. He wrote his dissertation on the Life and Work of Robert W. Selvidge. Since 1948, he has been a member of the staff of the Engineering College of the University of Missouri.

News Notes

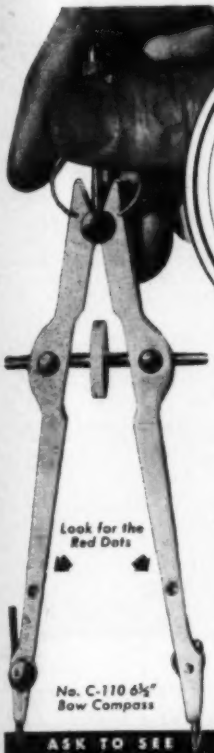
♦ Shop instructors are urged to write to Wayne P. Hughes, director, School and College Division, National Safety Council, 425 North Michigan Ave., Chicago 11, Ill., for information on council services, and a service guide which lists all school material.

♦ Shop additions have been authorized for the Pershing and Mackenzie High Schools in Detroit, Mich. These additions will be ready for occupancy about May 15, 1951. The Pershing addition includes an auto shop, a machine shop, a general purpose industrial-arts shop, an electrical shop, and two drawing rooms. The Mackenzie addition substitutes a general woodworking shop for the auto shop.

♦ An addition to the Wilbur Wright Vocational High School, Detroit, Mich., has been authorized. It is expected that construction work will begin about July 1. The addition will include a gymnasium and health education facilities and several classrooms.

♦ Certification requirements for vocational school teachers, supervisors, co-ordinators, counselors, and directors in the state of Wisconsin are being revised. To date the Certification Committee has completed revisions for teachers in trade and industry, business education, distributive education, and general subjects. The new certification for trade and industrial teachers was adopted by the State Board of Vocational and

(Continued on page 42A)



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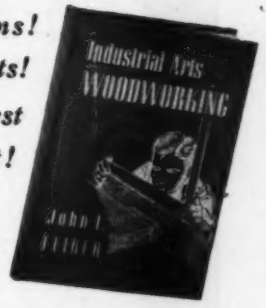

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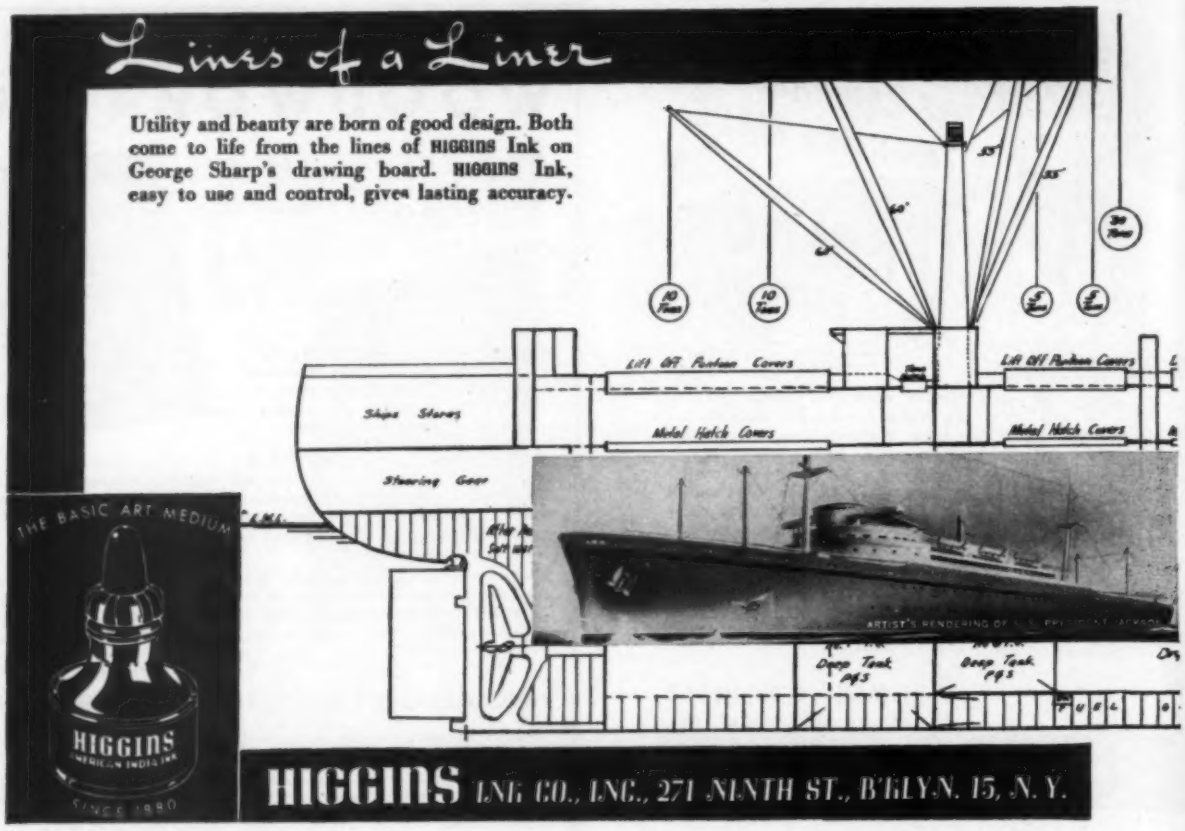
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NEWS NOTES

(Continued from page 40A)

Adult Education at its December meeting. The other three revisions will be presented to the state board at a future meeting.

Three notable provisions high-light the new trade and industrial certification plan. They deal with tests, workshops, and types of certificates. In addition to specific educational achievements all newly employed teachers hereafter will be required to take a trade test which will be in three parts performance, written, and oral. Individuals coming from trades without degrees, also those who do not intend to obtain degrees, will be required to attend three one-week workshops which will be planned to meet the needs of the individual.

♦ A course in cosmetology will be established in September in the Chadsey High School (Trade Division) in Detroit. This will be the first cosmetology course in Michigan to be operated under public school authority. Needs in Michigan previously have been met through private schools. The course will meet the standards set up by the State Board of Cosmetology.

♦ Graduation functions for the apprentices in the construction trades were held in Detroit during January and February this year. Completion certificates were formally presented to 700 apprentices. These young men, who had completed the requirements of their apprenticeship during the preceding year, were brought together to receive this recognition.

The completion certificates were usually presented at a dinner meeting at which the apprentices and their ladies were the guests of the Joint Apprenticeship Committee. Incidentally, the teachers, the principal, and a representative from the superintendent's office were also included as guests of the Joint Apprenticeship Committee. Formerly, graduation exercises were held for the combined group, but the great numbers involved made it quite difficult to handle such a joint meeting; hence the graduating exercises were planned individually for each trade by its Joint Apprenticeship Committee. The smaller group made the ceremony more personal, and it was generally more effective. At present, there are 3000 apprentices attending the Apprentice Training School in Detroit.

♦ A course in Practical Nurse Training is being offered at the Goldberg Trade School for Girls and Women in Detroit, Mich. Forty-eight women are admitted every eight weeks through a selective examination. These students begin the course with eight weeks of full-time instruction in the school, then are assigned to hospitals for practical work experience for eight weeks. Then they again return to the school for eight weeks, following which they are given various assignments with the co-operating hospitals in the area, where they are under the supervision of the school co-ordinator for the remainder of the year. The duties and functions of the practical nurse in relation to the professional nurse are becoming very well established.

♦ A course in advertising art direction and printing production for the small businessman or advertising manager who takes a hand in the purchasing and production of art work and printing, is announced for the spring term at the Workshop School of Advertising and Editorial Art, 666 Fifth Avenue, New York. Instruction in layout, copy, reproduction and printing processes, cost estimation, photography and design development will be adapted in this course to the needs of the businessman who handles his advertising in his own shop or plays an active part in supervising the work of his advertising agency.

The course will be given Wednesday evenings, seven to ten.

♦ Hazel C. McIntire, of the Ohio Department of Education, points out in the fall issue of *The Sight-Saving Review*, a publication of the National Society for the Prevention of Blindness, that despite his handicap, a wide range of occupations are open to the partially-sighted child.

With wise counsel from parent and teacher, says Mrs. McIntire, the visually handicapped youngster may enter occupations in nearly every vocational category. The limitations of poor sight should not be overemphasized to such a child, but at the same time, it must recognize that partial vision may limit to some extent his ability to hold certain jobs.

A survey of jobs held by graduates of Detroit classes for visually handicapped children shows that some have become doctors, ministers, accountants, engineers, nurses, photographers, librarians, salesmen, clerks, comptometer operators, governesses, waiters, farmers, plumbers, painters, bakers, mechanics, and truck and cab drivers.

♦ A 16mm. sound motion picture, running 20 minutes that may save lives, portrays what chances of survival there are for those who are in a community against which an A-bomb is launched. Victims are not helpless against such an attack even if they have only three seconds

(Continued on page 45A)

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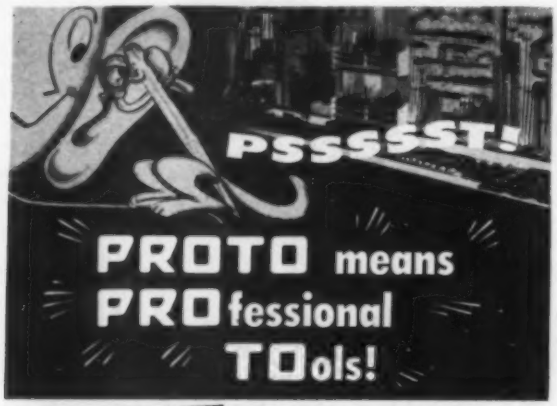

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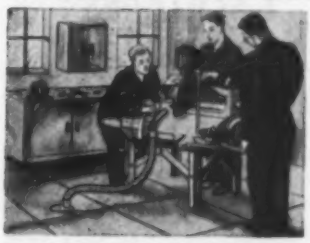

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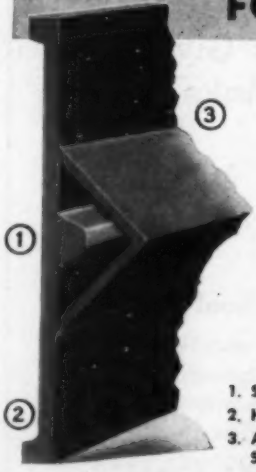

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NEWS NOTES

(Continued from page 42A)

to decide what to do if a bomb explodes in their vicinity, if they are forearmed with the knowledge of how to protect themselves. This knowledge of *what to do* in case of attack is presented in a vivid and dramatic form in a 20-minute sound motion picture, "You Can Beat the A-Bomb."

Prepare yourself and students with this timely film stressing the preventive measures that will save lives.

For further information write to *McGraw-Hill Book Company, Text-Film Department, 330 West 42nd Street, New York 18, N. Y.*

♦ Charles A. Bennett Co., Inc., Peoria, Ill., announces four film strips on *Woodworking* and four film strips on *Metal Working*. These film strips are $3 each list, and they have been produced and are distributed co-operatively by Charles A. Bennett Company and the Society for Visual Education, Inc.

♦ A course in *School Shop Safety Education* has been added to the Industrial Education curriculum at Iowa State College, Ames, Iowa. This course carries two hours of credit and was offered for the first time during the 1950 winter quarter. Briefly, this course includes a study of accidents and accident prevention in the school shop and methods of initiating an effective safety program. It is felt that the industrial education graduates should be well grounded in the basic elements of safety whether they go into teaching or into industrial work.

♦ Duplicates of 700 tape recordings for public school use were offered free to American school systems in November by the Minnesota Department of Education.

The department offered to re-record all or part of its educational tape recordings for any state or U. S. territory that would make the recordings available to its schools without charge.

The tape recordings constitute the master library of Minnesota's year-old experimental "Tapes for Teaching" program, which records educational radio programs for replaying in schools.

Objectives are to make the desired radio broadcasts available during regular classroom periods and to make the radio material available to isolated schools where radio reception is poor.

Minnesota's facilities cannot accommodate the thousands of schools outside the state, but Commissioner Dean M. Schweickhard states that arrangements have been made to make duplicate master recordings for a single agency in each state for redistribution to that state's schools.

This offer ends June 30, 1951, since the educational grant for experimentation expires at that time, and the work will have to continue on state funds, so services then will necessarily be confined to Minnesota.

For further information address Richard C. Brower, state supervisor of visual and radio education, St. Paul, Minn.

♦ A revised and more comprehensive edition of the Carrier, Cherne and Grant engineering text, *Modern Air Conditioning, Heating and Ventilating*, has just been issued by Pitman Publishing Corporation.

It includes Dr. Carrier's newest psychrometric chart based on enthalpy, which has been accepted by the American Society of Refrigerating Engineers as the standard Society chart. His original Rational Psychrometric Formulae, presented in 1911, became the authoritative basis for all fundamental calculations in the air conditioning industry.

The book covers thoroughly the broad and overlapping fields of heating and ventilating, air conditioning, and related refrigeration engineering. It considers its subjects on both a theoretical level as well as on the practical one of design, application, and use of systems and equipment. Attention is given to figuring costs in order to determine the most economical investment.

Revisions include new developments and new data uncovered during the past decade. Absorption refrigeration, which has gained recent prominence and commercial importance, air purifying methods, electrostatic precipitation, and radiant and panel heating are among the subjects given extended treatment in the new version.

A number of problems have been added to assist in classroom work, and to illustrate procedures in design of systems and choice of equipment for application engineers.

The appendix has been completely rearranged, and includes revised, expanded, and in some cases new tables, not previously published, on such subjects as local outside design conditions in this country and abroad, heat transmission and solar heat gain through various types of walls and substances, and properties of saturated steam and saturated refrigerant vapors. It also includes a valuable section on air conditioning guarantees.

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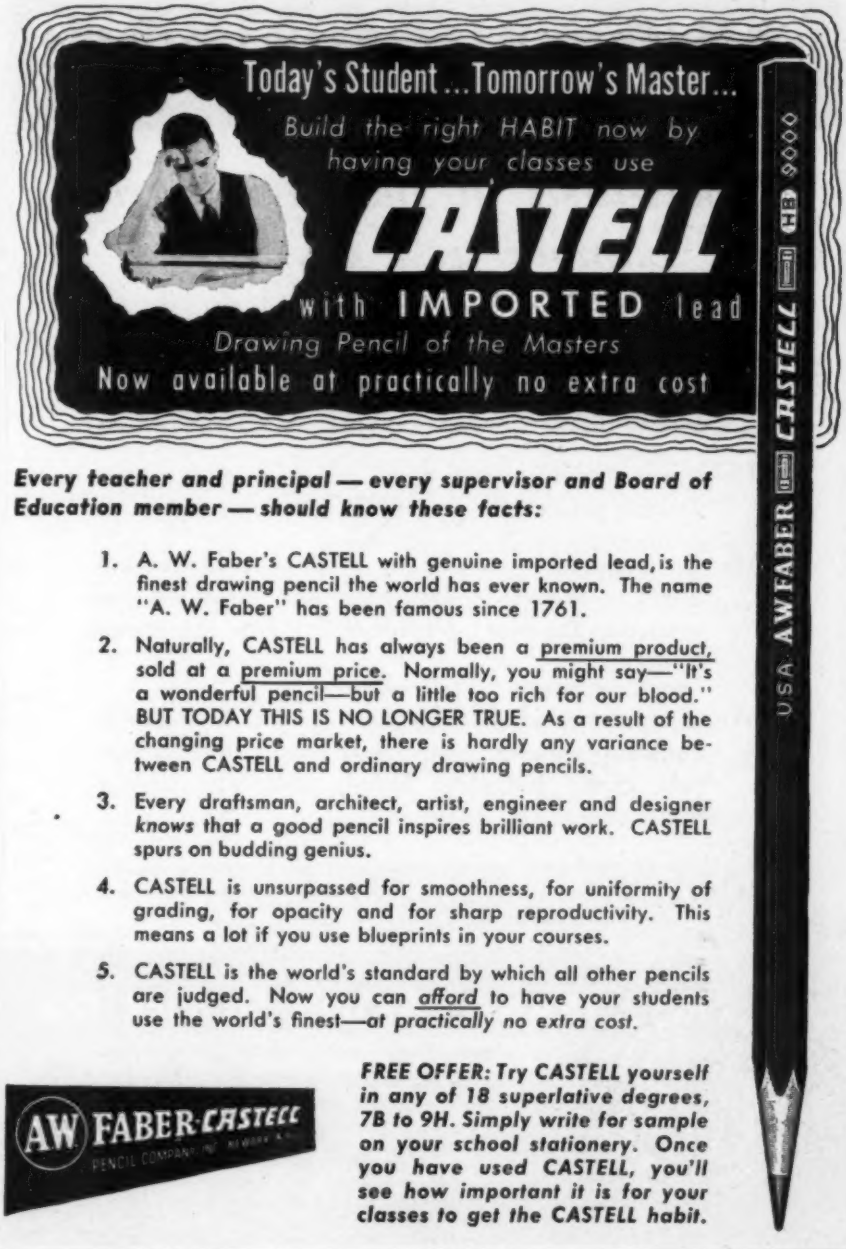
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New Publications

Automotive Engines

By Frazee, Bedell, and Venk. Published by the American Technical Society, Chicago, Ill.

This is the second in a series of automotive books published by the American Technical Society, with Earl L. Bedell as editor-in-chief. Ten books are contemplated in the series when completed.

It is an interesting and unique application of co-operation with an industry. The authors are automotive men, and their particular contribution is in the area of their specialization. Among the contributing authors will be men from all of the major automobile manufacturing companies, as well as manufacturers of service equipment.

The first book in the series, *Automotive Fundamentals*, which came off the press about a year ago, has received general acceptance as a text by factory service divisions for training service mechanics, as well as by trade schools.

Understanding Radio

By Herbert M. Watson, Herbert E. Welch, and George S. Eby. Cloth, 716 pp., 6⅛ by 9¼ in., illus., $4.20. McGraw-Hill Book Co., New York 18, N. Y.

A revised edition of a text designed for students and beginners who have but a meager background in electricity, science, or mathematics. For this reason nontechnical terms are used whenever possible, and the required mathematics is explained as simply as possible.

Many line drawings are used to show how to construct breadboard radio sets and unit circuits. Standard chassis type of construction also is undertaken.

Among the new circuits shown in the book are public-address units, intercommunication sets, phase inverter circuits, and frequency modulation.

Methods of Vocational Guidance

By Gertrude Forrester. Cloth, 463 pp., 5⅞ by 8¼ in., $4.25. D. C. Heath and Company, Boston, Mass.

This revised and enlarged edition presents detailed guidance methods, suggests sources of guidance material, explains tried and tested counseling techniques, gives practical suggestions on how to file guidance material useful to the guidance counselor, and describes many useful activities that may be undertaken by those who come to the counselor for help and advice.

The Foreman's Production Job

By A. L. Kress and T. O. Armstrong. Cloth, 152 pp., 5¼ by 8½ in., illus., $2.50. National Foremen's Institute, Inc., Deep River, Conn.

This book tells the foreman in brief and concise manner just what his job is. How much maintenance and production control; methods and quality control; and result management rests on his shoulders.

It also points out to him what his responsibilities are in producing improvement in methods, in determining wages, in preventing accidents, and in producing better industrial relations.

Practical Paper Technology

By William Bond Wheelwright. Paper, 101 pp., 6 by 9 in., $2.25. M. J. & W. B. Wheelwright, Publishers, Cambridge, Mass.

A manual containing the material used for a lecture course given to industrial people connected with the manufacture of the needs of those who are engaged in making paper and those who need general information on the subject because they use and handle paper.

The various chapters inform the reader on the history of papermaking, how it may be judged, what its physical aspects are, how it may be tested, and made. Then it describes coated and glazed paper, discusses the permanency of various kinds of paper, and its use in printing, etc.

The book also contains a bibliography.

Power Tools and How to Use Them

By W. Clyde Lammey. Cloth, 144 pp., 6⅛ by 9½ in., illus., $2.50. Popular Mechanics Magazine, Chicago 11, Ill.

An exceedingly useful book for the homecrafter. It tells him how to plan his shop, light it, make his cabinets, tool panels, and benches. Then it describes the woodworking tools and what tools are most needed. How to use these tools is minutely described.

The book also contains a directory of sources for tools and supplies, and a considerable number of projects that may be made with power tools. Step-by-step instructions accompany the description of the projects.

(Continued on page 48A)

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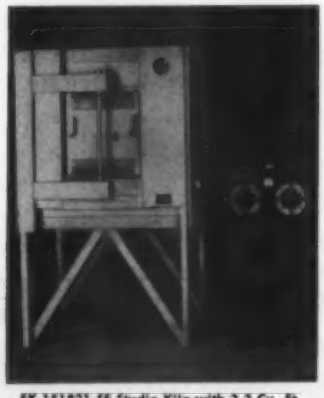

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NEW PUBLICATIONS

(Continued from page 46A)

The Aluminum Data Book

Glossy coated paper cover, spiral binding, 194 pp., 6 by 8¾ in., illus. Reynolds Metals Co., 2500 S. Third St., Louisville, Ky.

This data book gives the vital facts on aluminum alloys and mill products. It contains 117 tables of data on physical, chemical, and mechanical properties; weights, standard sizes, production limits, and fabrication data.

Bricklaying II

By F. William Rau. Paper cover, plastic binding, 7¾ by 10¼ in., $3.50; clothbound, $4.25. Delmar Publishers, Inc., Albany 1, N. Y.

This is the second volume of a three-volume course on bricklaying. The material is organized into units of instruction. Each unit covers a major division of the bricklayer's trade.

Each unit also consists of related technical information and accompanying shop jobs.

The table of contents present a breakdown of the units, and at the same time a means of recording the student's progress.

The Compounding and Hyphenation of English Words

By Alice Morton Ball. Cloth, 246 pp., 6¼ by 9¼ in., $4. Funk & Wagnalls Co., 153 East 24th St., New York 10, N. Y.

A ready-reference book for all who write. It explains the purpose of compounding words and gives the general principles underlying the rules of compounding. The book also contains an alphabetical list of compound words and of two-noun phrases.

Getting Along With Brothers and Sisters

By Frances Ullmann. Paper, 48 pp., 5½ by 8½ in., illus., 40 cents. Science Research Associates, 228 S. Wabash Ave., Chicago 4, Ill.

Brothers and sisters need not necessarily be quarrelsome all of the time. This book will show them how to improve relationships that may exist now but shouldn't. Improve these relationships and discover that brothers and sisters can be fun to have around.

Vocational Guidance Manuals

Opportunities in Photography

By Jacob Deschin. Paper, 112 pp., 5 5/16 by 7 13/16 in., $1. Vocational Guidance Manuals, Grosset & Dunlap, New York, N. Y.

A survey of jobs and careers in photography and allied fields.

Opportunities in Television

By Jo Ranson and Richard Pack. Paper, 128 pp., 5 5/16 by 7 13/16 in., $1.

Information about the field, together with advice from TV experts, employment requirements, and suggested training.

Opportunities in Music

By Sigmund Spaeth. Paper, 128 pp., 5 5/16 by 7 13/16 in., $1.

(Continued on page 50A)

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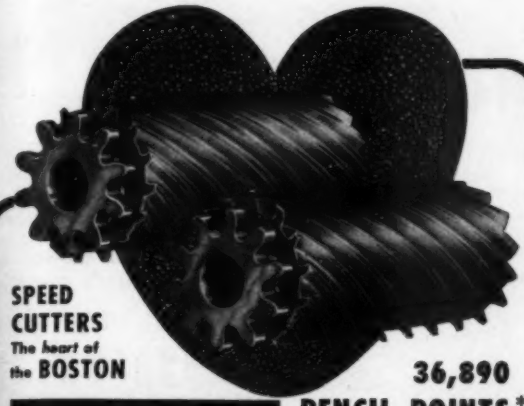

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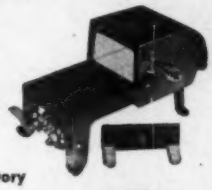

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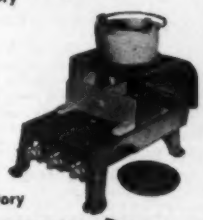

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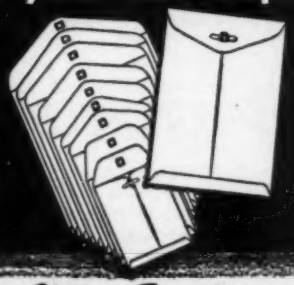

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By A. S. Emery. A course for apprentice building craftsmen on the geometry needed for figuring window frames, arches, staircases, brick facings, roofs, drains, and scores of other building details.

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By R. H. Drake. This volume completes the Aircraft Mechanic Series of texts for all or any part of the training for the CAA aircraft and engine license examinations and for specialist ratings. Clearly written and thoroughly illustrated, these books include essential background information on principles and materials as well as step-by-step instruction in tools and techniques. The series includes the following volumes:

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The Macmillan Company, 60 Fifth Ave., New York 11

NEW PUBLICATIONS

(Continued from page 48A)

Science Research Associates Booklets

Helping Children to Read Better

By Paul Witty. Paper, 48 pp., 5½ by 8½ in., illus., 40 cents. Science Research Associates, 228 S. Wabash Ave., Chicago 4, Ill.

A book containing directions and materials which teachers and parents can use to assist preschool and older children to learn how to read better.

SRA Reading Accelerator

By Elizabeth A. Simpson. Paper, 34 pp., 5½ by 8½ in., illus.

A manual of operating the SRA reading accelerator machine in order to learn how to read faster. The accelerator is a moving shutter which may be adjusted to descend over a column of print at from 30 to 2400 words per minute.

Self-Understanding — A First Step to Understanding Children

By William C. Menninger, M.D. Paper, 48 pp., 5½ by 8½ in., illus., 40 cents.

This book shows how the behavior patterns and attitudes of parents and teachers affect a child's development.

How to Write Better

By Rudolf Flesch. Paper, 48 pp., 5½ by 8½ in., illus., 40 cents.

A guide to writing which helps the writer to marshal his ideas, plan the writing, and put thoughts down clearly and interestingly.

Readers' Guide to Periodical Literature (Unabridged)

The H. W. Wilson Co., publishers of indexes and reference works, 950–972 University Ave., New York 52, N. Y., have just issued their Fiftieth Anniversary number.

The history of the Readers' Guide contained in this anniversary number is very interesting and the company is to be heartily congratulated on the fine work that the first fifty years of its existence has produced.

Vocational Education in Minnesota

This bulletin was prepared by and submitted by a subcommittee of the Minnesota Committee on Vocational and Higher Education. In it the status of vocational, agricultural, business, homemaking trade and industrial, guidance, area vocational-technical education are thoroughly discussed. The Minnesota voluntary apprenticeship, qualifications of vocational teachers, and the evaluation of vocational offerings also are presented.

A listing of jobs and careers together with information and advice for those who want to enter this field.

Atomic Attack — A Manual for Survival

By John L. Balderston, Jr., and Gordon W. Hewes. Paper, 55 pp., 5⅜ by 8⅜ in., $1.

Defense against the atomic bomb is not impossible. *A Manual for Survival,* just released, is a practical handbook for Civil Defense organizations, and others connected with disaster committees. It is also a "What to do Book" for the individual.

Heraldic Designs and Engravings

By J. M. Bergling and A. Tuston Hay. Cloth, 92 pp., 10⅝ by 7⅞ in., illus. Published by V. C. Bergling (Technical Art Books), Coral Gables 34, Fla.

This is a revised and enlarged edition of this very interesting book. It presents to the beginner 2000 illustrations of armorial bearings and figures together with a technical dictionary of heraldic terms.

Numerous monograms and ciphers are shown, and the book will be decidedly helpful to those who do lettering, design monograms, make ornamental designs, and prepare coats of arms and offer heraldic services.

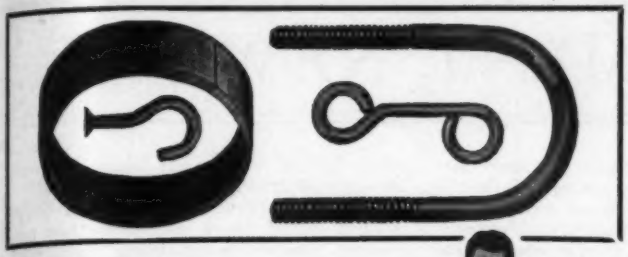
American Indian Beadwork

By W. Ben Hunt and J. F. Burshears. Cloth, 63 pp., 9⅛ by 12¼ in., illus., $5. The Bruce Publishing Co., 400 N. Broadway, Milwaukee 1, Wis.

A book which will delight the hearts of all interested in Indian lore. Scout leaders and their scouts will be especially pleased with the large varicolored and beautifully designed belts, arm and leg bands, border decorations, hat bands, brow bands for headdresses, floral designs of many kinds for shirt and arm strips, as also designs which can be used to decorate dresses, cuffs, pocketbooks, and the like.

The book also contains a short history of Indian beadwork, and descriptions of beading looms, together with directions for sewing beadwork with thread or with sinews.

The illustrations accompanying the explanations are all from Ben Hunt's gifted pen, and the color plates are simply superb.



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SHOP EQUIPMENT NEWS

THE "100 PLUS" NO. 610 HAND DRILL

Stanley Tools of New Britain, Conn., announces the new "100 Plus" No. 610 Hand Drill. This new streamlined drill bores holes up to ¼-in. capacity into hardwood or metal. The smoother action is the result of a higher spindle torque. The drill is equipped with solid cast iron speed gear and two steel pinions; and ball bearings on the spindle to carry the drilling pressure. Gears are totally enclosed and protected from dust by a lightweight aluminum housing.

The drill is mischief-proof with all parts locked in place — no parts to lose, and no pinched fingers. The protected jaw spring chuck affords positive jaw action through concealed springs that hook into the jaws of the new ¼-in. chuck. The drill point cannot jam or bend the springs.

The handles are made of hardwood. All trim is nickel plated.

The Stanley No. 610 hand drill is compact, lightweight, and excellent for close-quarter work.

For further information write to *Stanley Tools, Division of the Stanley Works, New Britain, Conn.*

For brief reference use IAVE—0501.

WELDING GUN FOR WELDING PLASTICS

A Hot Air Welding Gun for use in welding plastics such as Lucoflex, is being manufactured by Almac Engineering Co., Pittsburgh, Pa.

The gun is used with a compressor, also furnished by the company, or any standard source of compressed air that delivers a pressure of 4 to 5 lb.

Welding gun for plastics

This air is carried through the barrel over a self-contained electrical heating unit and is delivered at the tip in sufficient quantities and pressure. The tip temperature is approximately 350 deg. F. which will provide effective and economical welding of plastics.

The gun is ready to operate by simply plugging into 110-volt, 60-cycle a.c. current and connecting to compressor or air supply. It is lightweight, portable, and easy to use.

For further information write to *Almac Engineering Co., P. O. Box 5072, Pittsburgh 6, Pa.*

For brief reference use IAVE—0502.

BEAUTIFUL WOODS

Frank Paxton Lumber Company recently published a 50-page, 8½ by 11-in. pamphlet entitled "Beautiful Woods." This brochure is a real handbook for all who make use of wood.

The booklet contains an immense amount of information on lumber, its growth, the manner in which it is sawed up into boards, the grading of Western pines and hardwoods.

There also is a glossary of lumber terms, information on measuring lumber, a chart on the selection of wood, and tables of lumber weights.

The manufacture of plywood and veneer also is illustrated and explained and numerous popular woods are described. Besides this there is a list of sources for visual and training aids put out by some of the manufacturing associations.

The price of this book has been set at $1.

For further information write to *Frank Paxton Lumber Co., First and Kansas Ave., Kansas City 3, Kans.*

For brief reference use IAVE—0503.

STARRETT NO. 224 MICROMETER

This one micrometer can be used for all measurements from 6 in. up to 12 in., by means of interchangeable anvils. The micrometer combines in one tool many features that make it useful for all-round measuring in the 6 to 12-in. range.

The six anvils, furnished with the micrometer, are all readily interchangeable and provide the full range in steps of 1 in. Each anvil is marked to show capacity and is fitted with an adjusting collar which compensates for wear and acts as a seat when clamped in position by a locking collar. Suitable wrenches are furnished to make necessary adjustments.

Starrett micrometer No. 224

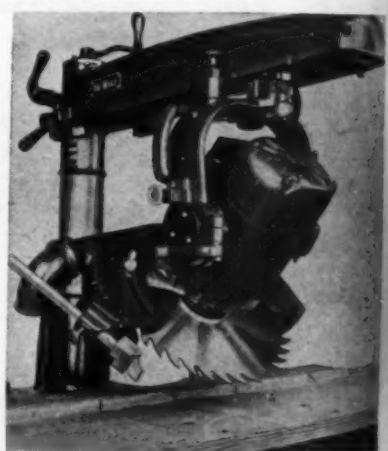
The steel forged micrometer frame is finished in black enamel. Sleeve and thimble have rust-resistant, no-glare satin chrome finish which makes markings stand out sharp and clear and easy to read under any illumination. Figures are quick reading for positive identification and decimal equivalents are stamped on the thimble. The one-piece spindle with hardened threads ground from the solid, insures lasting precision, and the lock nut positively maintains the setting of any reading.

For further information write to *The L. S. Starrett Co., Athol, Mass.*

For brief reference use IAVE—0504.

THE DEWALT MODEL GR RADIAL ARM SAW

DeWalt, Inc., Lancaster, Pa., recently announced a new and improved Model GR Radial Arm Saw. This power saw features a recently perfected DeWalt low-dead rise, direct drive motor. The design of this motor is such that there is a reduction from the bottom of motor casing to saw arbor which allows the feeding of thicker stock when the standard ¼-in. saw blade is used.



De Walt model GR radial arm saw

Another new and important feature is that this motor is of the totally enclosed type, which is extremely important from the standpoint of safety and the elimination of a fire hazard when the electric saw is in operation.

The motor unit of this new DeWalt Model GR is equipped with grease-sealed-for-life bearings plus wiring insulation that will stand double the normal amount of heat generated by the motor in operation.

The new Model GR DeWalt also is equipped with double row sealed-for-life bearings in the roller head assembly. This gives great rigidity to the machine during all cutting operations.

The machine will be available in both the standard and medium arm sizes which give a

(Continued on page 54A)

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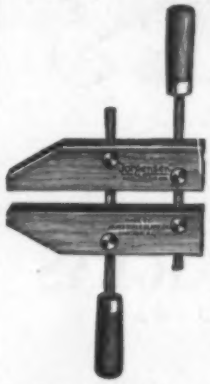

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No. 600

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SPECIFICATIONS

Model	Interior Size	Wattage 110V AC-DC	F.O.B. Phila. Price
600	12"Wx12"Dx12"H	700	$ 75.00
602	24"Wx12"Dx12"H	1400	125.00

THE ELECTRIC Hotpack COMPANY, INC.

5067 Cottman Ave. Philadelphia 35, Pa.

SHOP EQUIPMENT NEWS

(Continued from page 52A)

wide range of cross-cut capacities. The use of a 14-in. saw blade gives a cutting depth of 4½ in.

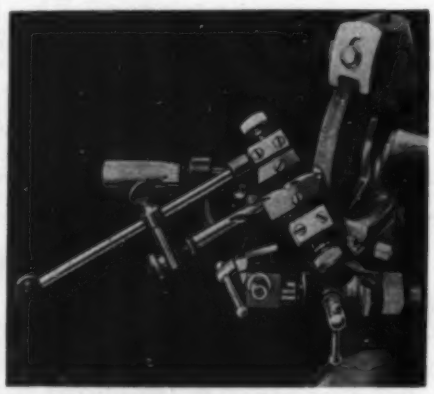
The DeWalt Model GR is available with motors ranging from 2 h.p., a.c./d.c. to 3 h.p. single phase and from 3 to 5 h.p. polyphase.

For further information write to *DeWalt, Inc., Lancaster, Pa.*

For brief reference use IAVE—0505.

NO. 1296 DRILL GRINDING ATTACHMENT

A drill grinding attachment No. 1296 for sharpening steel drills of any size from 1/8 to 5/8 in., using a standard tool grinder, has been developed by the Power Tool Division, Rockwell Mfg. Co. A necessity for the inexperienced operator who could not otherwise expect to sharpen a drill accurately, this device is a time saver in the hand of an expert mechanic. It is simple to operate and it produces correctly ground 2-, 3-, or 4-lip drills.



Drill grinding attachment No. 1296

While the drill grinding attachment is arranged at the factory to produce the standard 118-deg. lip angle with 12 to 15-deg. heel or clearance angle, it is easily adjusted for other lip angles and other clearance angles if so desired.

Micrometer adjustments also are provided. Spline shafts are used to provide rigidity in any position. All points of the unit can be adjusted for wear.

The No. 1296 drill grinding attachment is available through the Delta dealer organization. Further information can be obtained by writing directly to the *Power Tool Division, Rockwell Mfg. Co., Milwaukee 1, Wis.*

For brief reference use IAVE—0506.

NEW FOLEY AUTOMATIC POWER SAW SETTER

The new Foley Automatic Power Saw Setter for hand and band saws features an exclusive "twin hammer" action.

The twin hammers strike in opposite directions, so that both sides of the saw are set in one run through the machine, making the setting operation as speedy as it is accurate. A 26-in. 8-point handsaw, for instance, is set in 32 seconds.

Foley automatic power saw setter

Band saws having 3 to 8 points per inch are set at speeds from 4 to 15 seconds per foot.

The Foley Automatic Power Setter has simple, quick adjustments for size of teeth from 4 to 16 points per inch, for depth of set, and for firmly holding saws of different thickness between anvils. The Foley permits setting the saw either before or after filing as desired without dulling or breaking teeth. It is sold with a one year unconditional guarantee.

For full information write to *D. K. Foley Mfg. Co., Minneapolis 18, Minn.*

For brief reference use IAVE—0507.

THE 1951 BRODHEAD-GARRETT COMPANY CATALOG

The new Brodhead-Garrett Catalog will interest shop teachers, supervisors, and directors of industrial arts and vocational education by its wide listing of school shop materials, and hand and power equipment, used in teaching woodwork, metalwork, cabinetmaking, painting and finishing, auto mechanics, sheet-metal work, welding, art metalwork, hardening and melting, leatherwork, ceramics, weaving, and fine art supplies.

This catalog is unusually complete and will be found not only interesting but exceedingly helpful in every school shop.

Write for a copy to *Brodhead Garrett Co, Cleveland 5, Ohio.*

For brief reference use IAVE—0508.

NO. 2100 JORGENSEN PILING CLAMPS

The new style No. 2100 Jorgensen Piling Clamp will be of interest to all engaged in quantity production of edge-glued stock to make wide panels from narrow widths. With these bar clamps, the work can be "piled" to any desired height to make the greatest possible use of any given floor space.

No. 2100 Jorgensen piling clamp

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SHOP EQUIPMENT NEWS

These clamps have many advantages. They require no special starter bars, spacers, trucks, or fixtures of any kind. All clamping is done at the same side of the pile; each "layer" of work is clamped from above and below, eliminating "buckling" of the work; regardless of varying widths of stock being glued, the work is always centered on the pile; any reasonable thickness of stock can be glued, with a minimum of space between courses of work, making for greatest possible volume of work per pile; positive screw pressure provides ample load, and plenty of "take-up" on the work.

The clamps are extremely simple in construction and operation, and are available in a wide range of width capacities. Free literature and catalog are available upon request to the manufacturers, *The Adjustable Clamp Co., 424 N. Ashland Ave., Chicago 22, Ill.*

For brief reference use IAVE–0509.

BOICE-CRANE COMPANY'S "TRU FORM" CUTTER CHECK CHART

Probably one of the most unique and useful cartons ever designed for a product distributed in the woodworking machine field has just been put into use by Boice Crane Co., power tool manufacturers, for packaging their individual "Tru-Form" Shaper Cutters.

All sides of the carton are employed in illustrating a check chart and instructions for regrinding to retain all the advantages of free cutting, unchanging shape, and extra life originally engineered into the cutter. Detailed instruction sheets also are included in the package.

Also packaged with "Tru-Form" cutters sets, along with the detailed regrinding instruction sheet, are durable cardboard cutter Check-Chart templates for guidance in proper grinding and joining of the particular cutters. Cartons and templates are all copyrighted.

A new brochure on the complete line of *Boice-Crane* "Tru-Form" Shaper Cutters will be sent to anyone addressing *Boice-Crane Company, 932 Central Avenue, Toledo 6, Ohio.*

For brief reference use IAVE–0510.

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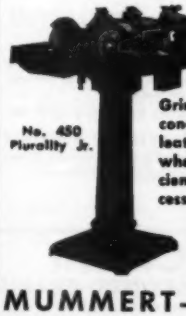

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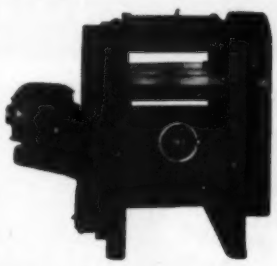

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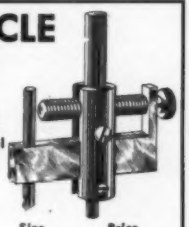

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